DORMAN, LONG & Co. Ld.

MIDDLESBROUGH

ENGLAND

1906

POCKET COMPANION

CONTAINING

USEFUL INFORMATION & TABLES

PERTAINING TO
THE USE OF

STEEL

MANUFACTURED BY

DORMAN, LONG & Co.
LIMITED

MIDDLESBROUGH, ENGLAND.

COMPUTED AND EDITED BY
THE CONSTRUCTIONAL DEPARTMENT.

FOR THE USE OF ENGINEERS, ARCHITECTS
AND BUILDERS.

1906

MIDDLESBROUGH:
WILLIAM APPLEYARD AND SONS, LIMITED,
PRINTERS.

DORMAN, LONG & CO. LIMITED.

REGISTERED OFFICE OF THE COMPANY:

MIDDLESBROUGH.

TELEGRAPHIC ADDRESS: "DORMAN, MIDDLESBROUGH."

Head Office and all Departments use the following codes:

LIEBER'S TELEGRAPHIC CODE.
WESTERN UNION TELEGRAPHIC CODE.
A.B.C. TELEGRAPHIC CODE, 5th edition.
A.1. TELEGRAPHIC CODE.
BRITISH STANDARD SECTION CODE.

Britannia Steel Works and Rolling Mills, Middlesbrough.
Telegraphic Address: "DORMAN, MIDDLESBROUGH."

Constructional Department, Middlesbrough.
Telegraphic Address: "DORMAN, MIDDLESBROUGH."

Clarence Steel Works, Port Clarence, Middlesbrough.
Telegraphic Address: "DORMAN, PORT CLARENCE."

Cleveland Wire Works, Middlesbrough.
Telegraphic Address: "RODS, MIDDLESBROUGH."

Sheet Works, Middlesbrough.
Telegraphic Address: "NAMROD, MIDDLESBROUGH."

BRANCH OFFICES, WORKS AND STOCKYARDS

AT THE FOLLOWING PLACES.

LONDON. Office: 19 Victoria Street, S.W.
Telegrams: "PUGILISM, LONDON."

Stockyard and Shops: Nine Elms Lane, S.W.

Sheet Dept. / Wire Dept. — Office: 23 Leadenhall Street, E.C.
Telegrams: "TREFILEUR, LONDON."

MANCHESTER. Office: 42 Deansgate.
Telegrams: "ACERO, MANCHESTER."

NEWCASTLE. Office: 10 Neville Street.
Telegrams: "ECHALAZ, NEWCASTLE."

GLASGOW. Office: Gordon Chambers, 90 Mitchell Street.
Telegrams: "BEAM, GLASGOW."

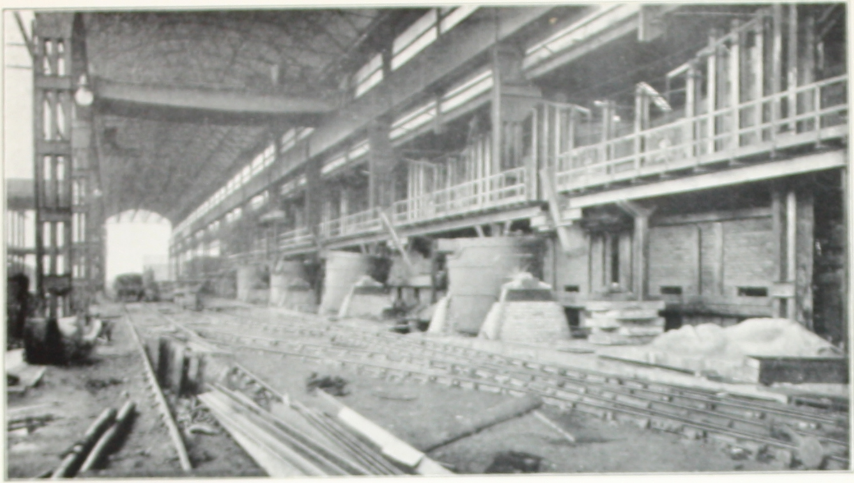
AUSTRALIA. Works & Stockyard: Grant St., South Melbourne.
Telegrams: "GIRDERS, MELBOURNE."

SOUTH AFRICA—

CAPE TOWN. Office: 7 & 8 Parker's Buildings, corner of Burg and Strand Streets.
P.O. Box 1263. Telegrams: "STRUCTURAL, CAPE TOWN."

JOHANNESBURG. Office: Leake's Buildings, 5 Harrison Street.
P.O. Box 4642. Telegrams: "JOISTS, JOHANNESBURG."

Properties of the Company.

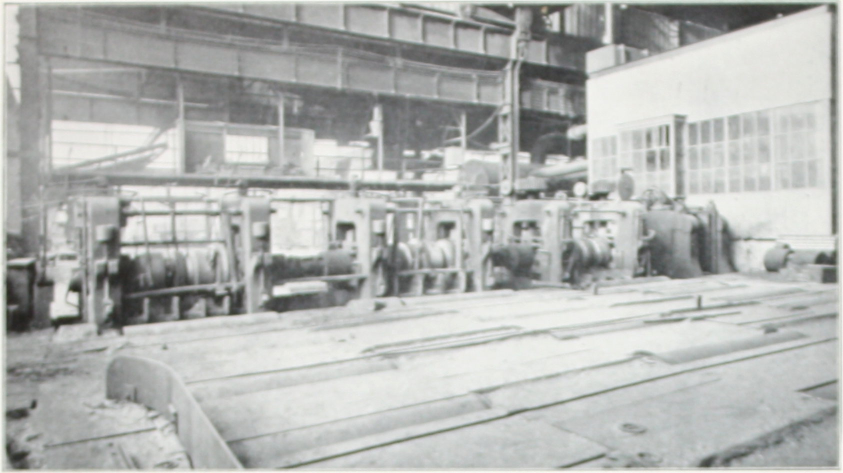


Dorman, Long & Co. Ld. Middlesbrough.

BRITANNIA STEEL FURNACES.

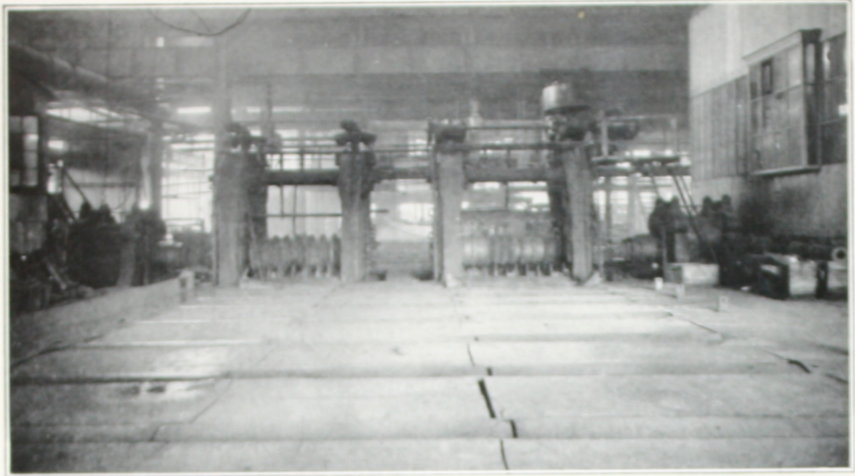
Dorman, Long & Co. Ld. Middlesbrough.

BRITANNIA STEEL FURNACES.—300 TON MIXER FOR MOLTEN IRON.



Dorman, Long & Co. Ld. Middlesbrough.

BRITANNIA ROLLING MILLS.—No. 1 MILL.

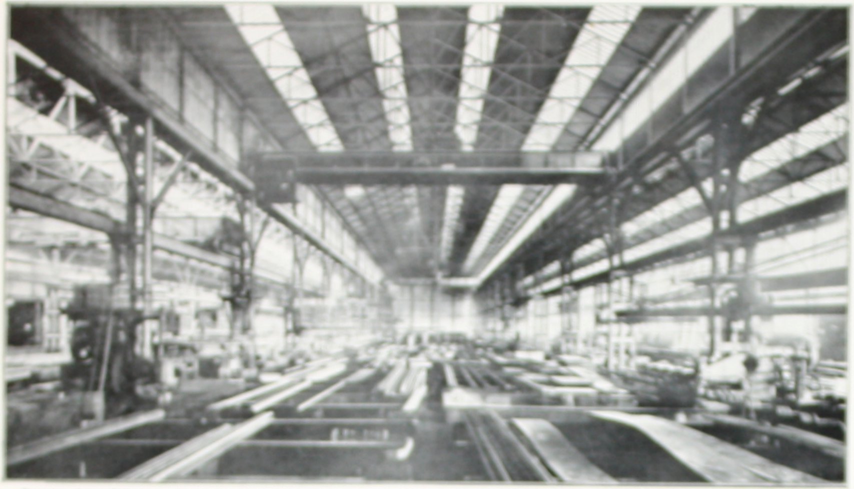


Dorman, Long & Co. Ld. Middlesbrough.

BRITANNIA ROLLING MILLS.—No. 2 MILL.

Dorman, Long & Co. Ld. Middlesbrough.

CONSTRUCTIONAL DEPARTMENT.—BRIDGE AND GIRDER SHOP, NO. 2 BAY.



Dorman, Long & Co. Ld. Middlesbrough.

CONSTRUCTIONAL DEPARTMENT.—BRIDGE AND GIRDER SHOP, NO. 3 BAY.

Dorman, Long & Co. Ld. Middlesbrough.

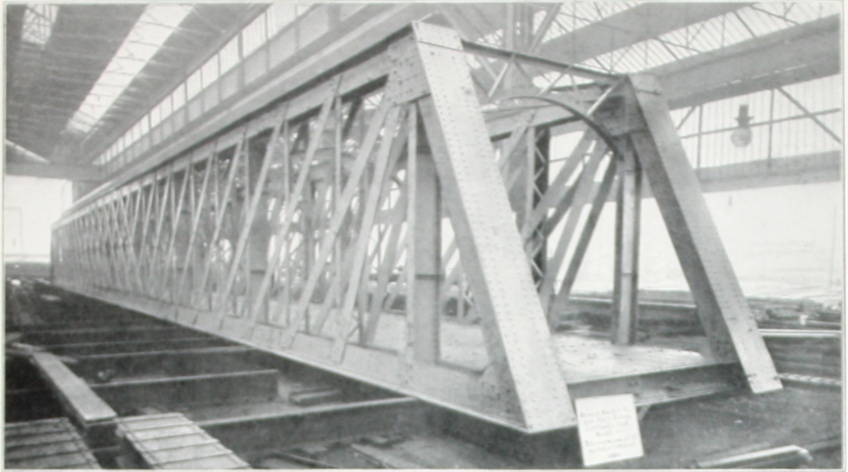
ELECTRIC TRAMWAY CAR SHED.

SUPPLIED AND ERECTED BY D. L. & CO. LD.

Dorman, Long & Co. Ld. Middlesbrough.

STEEL FRAME BUILDING.

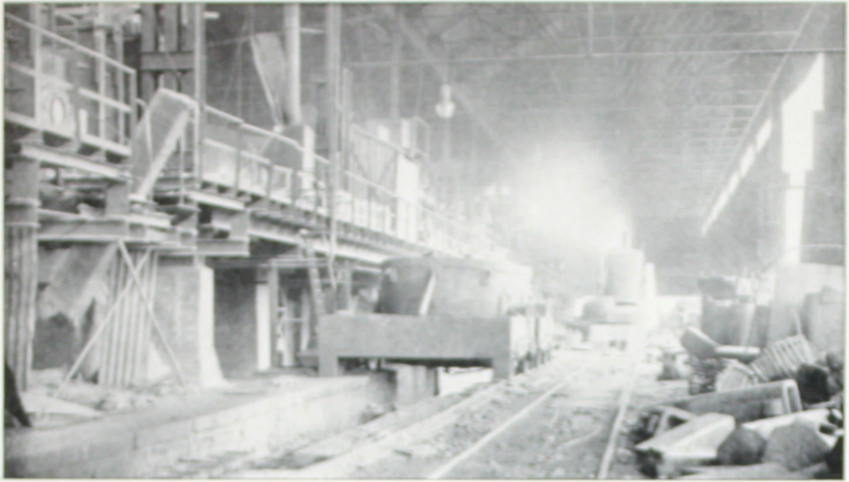
SUPPLIED AND ERECTED BY D. L. & CO. LD.



Dorman, Long & Co. Ld. — *Middlesbrough.*

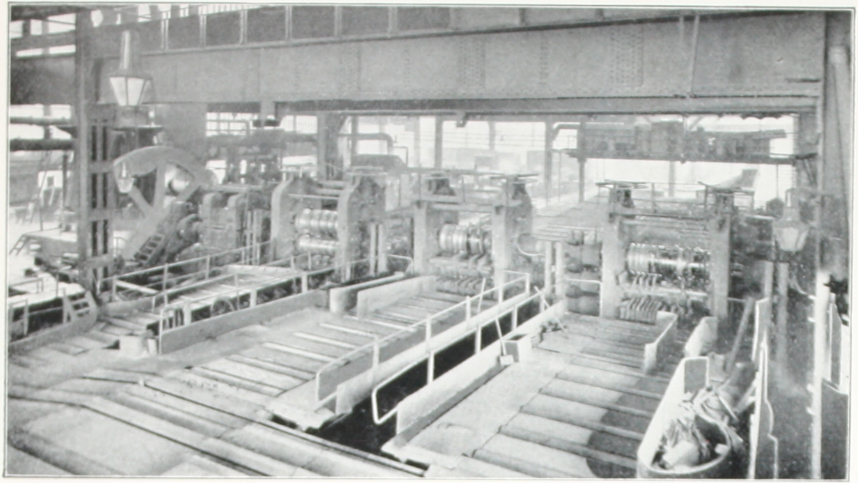
BRIDGE OF 200 FEET SPAN.

BUILT BY D. L. & CO. LD.



Dorman, Long & Co. Ld. Middlesbrough.

CLARENCE STEEL FURNACES



Dorman, Long & Co. Ld. Middlesbrough.

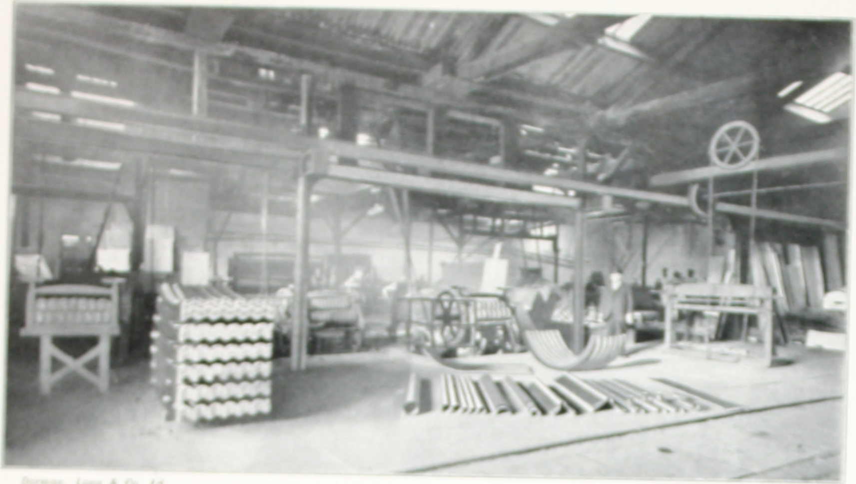
CLARENCE ROLLING MILLS.

Dorman, Long & Co. Ld. Middlesbrough.

CLEVELAND WIRE WORKS.—WIRE DRAWING SHOP.

Dorman, Long & Co. Ld. — Middlesbrough.

SHEET DEPARTMENT.—ROLLING MILLS.



Dorman, Long & Co. Ld. — Middlesbrough.

SHEET DEPARTMENT.—CORRUGATING SHOP.

PREFACE.

IN recent years there has been a large extension of the properties of this Company, and we feel that the several editions of our hand book—the first of which was issued in 1887—do not contain an adequate or complete account of the whole of our productions.

The property now comprises the following :—

Steel Furnaces.

Rolling Mills for all forms of sectional material.

Constructional and Bridge Shops.

Sheet Department (Rolling Mills with Galvanizing and Corrugating Shops).

Wire and Wire Rod Mills.

Rail, Billet, Bloom and Slab Mills.

A full description of the products of each department is given in the present edition.

We have endeavoured to bring before consumers the utility of our various products. The tabular and general information has been so arranged as to allow of an easy and convenient reference, for the selection of the most economical form, for any given purpose.

All the information has been very carefully prepared by our own staff. It is in accordance with the best modern

practice, and meets the requirements of the leading Engineers, Architects, and others connected with Constructional Engineering, Shipbuilding and allied trades.

When the Engineering Standards Committee issued their list of British Standard Rolled Sections in 1903, the Company realised the advantages that would accrue from a general adoption of standard sections by both manufacturers and users, and at once made arrangements for rolling those that the market conditions appeared to demand. Certain sections, not included in the British Standard list, are also rolled by this Company to meet a special demand. Particulars of these will be found in the present edition.

Our steel is manufactured by the Basic Open Hearth process, which ensures an uniform and reliable product.

Our standard product for sectional material will give the following results under test :—

28/32 tons tensile stress per square inch.

20% elongation in eight inches.

40% reduction of area at point of fracture.

The steel is accepted by, and meets the requirements of, the several departments of His Majesty's Government, including the Board of Trade, War Office, India Office, Admiralty; also Lloyds and other surveys, and Engineers of the principal railways at home and abroad.

DORMAN, LONG & CO. LIMITED.

The stock of sections carried at Middlesbrough, London and Melbourne is in lengths of every foot from 10 feet to 40 feet for ordinary sections, and longer lengths can sometimes be obtained from stock.

The trade margin allowed in rolling sectional material is 2½% above or below the dimensions and weights listed, and we cannot undertake to execute any order without this allowance.

All sections, either from rolls or stock, are cut to a margin of 1″ over or under specified lengths. An extra is charged for cutting to within ⅛″ of exact length, and for machining square.

Attention is particularly directed to the full and complete list of sections designed for Shipbuilding purposes, for which line of business our mills are specially adapted.

The Constructional Shops have been specially equipped for the rapid production of all classes of structural work, including steel frame buildings, workshops and bridges, of all sizes. A few illustrations of work executed are included in this edition. As manufacturers of all classes of material required for such work, we carry at all times a large stock, and are thus in a most favourable position for the rapid execution of large or small contracts.

Our Constructional Department maintains a large and competent staff, prepared to submit designs and estimates at any time to meet customers' requirements.

DORMAN, LONG & CO. LIMITED.

At our London yard—Nine Elms Lane—a large quantity of material is always kept in stock, and as this branch also possesses well equipped shops, structural work of all classes can be obtained at short notice.

This Company have also a branch establishment at Melbourne, Australia, where an adequate stock of Beams, Angles and other material is held. This branch is also equipped to execute orders for all kinds of structural work.

We have endeavoured to standardise the details of ordinary constructional work to facilitate deliveries and effect economy for purchasers. If customers specify any of our standards for their requirements, we can give them better service than if their requirements are special or out of the ordinary, though these latter of course will have our best attention.

We trust that the form of the present pocket companion will be found acceptable. The accuracy attained in the calculations is such, that we have every confidence in recommending the use of the book to all requiring material manufactured by the Company, or who may be engaged in designing structures for which our products are adapted.

DORMAN, LONG & CO. LIMITED.

NOTES ON SECTIONS

Reference Marks.—The reference marks generally adopted throughout this work either indicate those sections determined by the British Standards Committee, or such as are being rolled to meet special demand; the former have the prefix B.S. (viz. :—British Standard), and the latter D.L. (viz. :—Dorman, Long & Co. Ld.), thus affording a ready means of identification.

Sections marked *.—On referring to diagrams and tables, certain sections will be found marked with an asterisk.

Up to the present, the demand for these sections has been so limited that they have not been regularly rolled, neither are they kept in stock. They will be supplied, however, on receipt of orders for a sufficient quantity to warrant putting in the rolls.

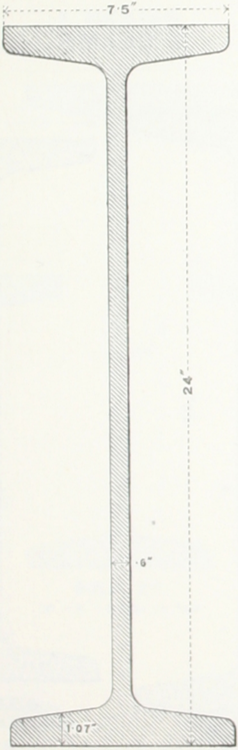
Weight of Steel.—All calculations for weights are based on a piece of steel one square inch sectional area and one foot long, weighing 3·4 lbs., or one cubic foot of steel weighing 489·6 lbs.

Mode of ordering material.—I beams, channels, zeds, bulb angles and bulb tees, should be specified according to the weights per foot given in the diagrams and tables, rails to the weights per yard given, but angles, tees, flats, &c., to the thicknesses required.

Variation from published weights or thicknesses.—The minimum weights or thicknesses given in the diagrams and tables cannot be decreased, but may be exceeded when the tonnage ordered is sufficient to warrant a change being made; the effect upon the profile being as indicated on page 32.

It should be observed, however, that such change is only of limited extent.

I BEAMS

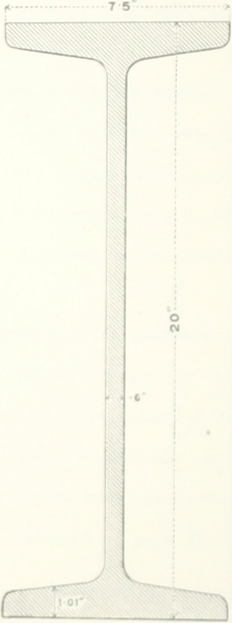


B.S.B. 30.

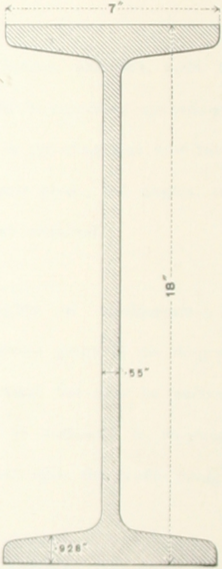
24″ × 7½″ × 100 lbs per foot.

FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 46 & 47.

I BEAMS



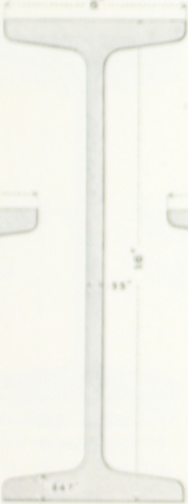
B.S.B. 29.
20" × 7½" × 89 lbs per foot.



B.S.B. 28.
18" × 7" × 75 lbs per foot.

FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 46 & 47.

I BEAMS



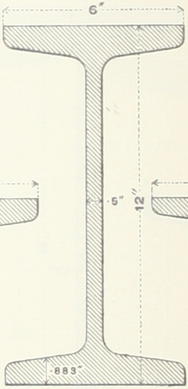
B.S.B. 27.
16" × 6" × 62 lbs per foot.

B.S.B. 26.
15" × 6" × 59 lbs per foot.

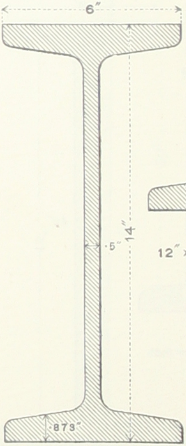
B.S.B. 25.
15" × 5" × 42 lbs per foot.

FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 45 & 47.

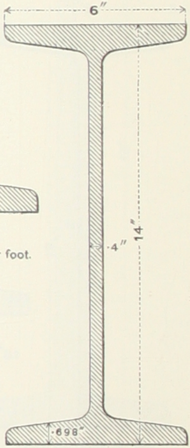
I BEAMS



B.S.B. 22.
12″ × 6″ × 54 lbs per foot.



B.S.B. 24.
14″ × 6″ × 57 lbs per foot.



B.S.B. 23.
14″ × 6″ × 46 lbs per foot.

FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 46 & 47.

I BEAMS

B.S.B. 21.

12″ × 6″ × 44 lbs. per foot.

B.S.B. 20.

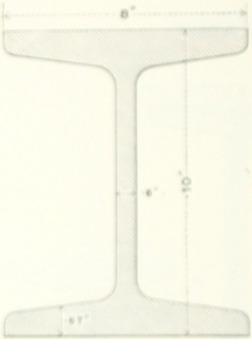
12″ × 5″ × 32 lbs. per foot.

D.L.B. 20A.

12″ × 5″ × 28 lbs. per foot.

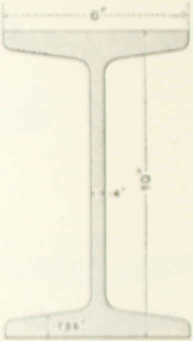
FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 46 & 47.

I BEAMS



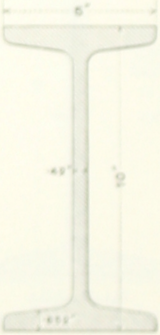
B.S.B. 19.

10" × 6" × 70 lbs per foot.



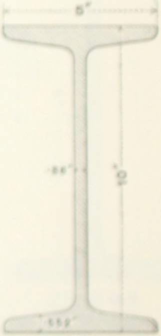
B.S.B. 18.

10" × 6" × 42 lbs per foot.



D.L.B. 17A.

10" × 5" × 35 lbs per foot.

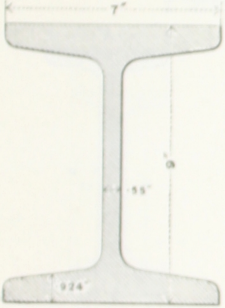


B.S.B. 17.

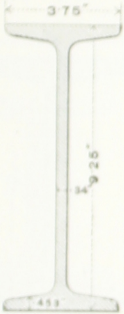
10" × 5" × 30 lbs per foot.

FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 46 & 47.

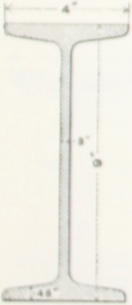
I BEAMS



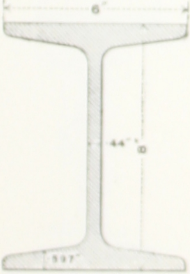
B.S.B. 16.
9" × 7" × 58 lbs per foot.



D.L.B. 15A.*
9¼" × 3¾" × 21½ lbs per foot



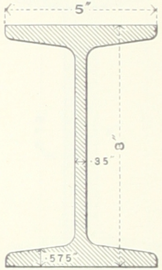
B.S.B. 15.
9" × 4" × 21 lbs per foot.



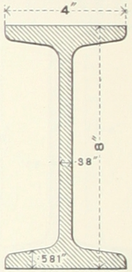
B.S.B. 14.
8" × 6" × 35 lbs per foot.

FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 46 & 47.

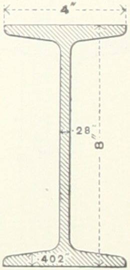
I BEAMS



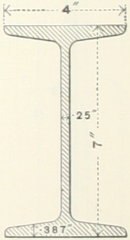
B.S.B. 13.
8" × 5" × 28 lbs per foot.



D.L.B. 12A.
8" × 4" × 25 lbs per foot.



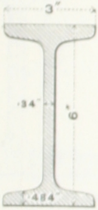
B.S.B. 12.
8" × 4" × 18 lbs per foot.



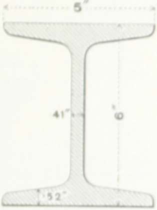
B.S.B. 11.
7" × 4" × 16 lbs per foot.

FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 46 & 47.

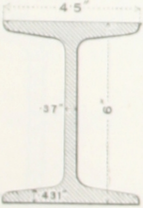
I BEAMS



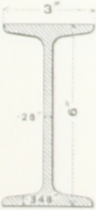
D.L.B. 8A.
6" × 3" × 16 lbs per foot.



B.S.B. 10.
6" × 5" × 25 lbs per foot.



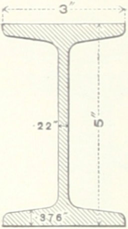
B.S.B. 9.
6" × 4½" × 20 lbs per foot.



B.S.B. 8.
6" × 3" × 12 lbs per foot.

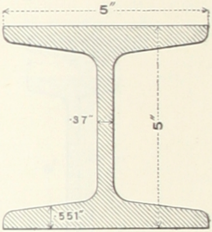
FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 46 & 47.

I BEAMS



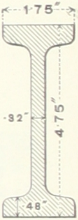
B.S.B. 6.

5″ × 3″ × 11 lbs per foot.



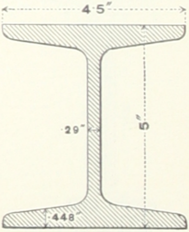
D.L.B. 7 A.*

5″ × 5″ × 24 lbs per foot.



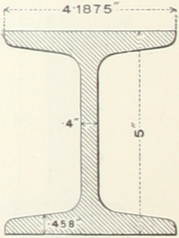
D.L.B. 5 A.

4¾″ × 1¾″ × 10 lbs per foot.



B.S.B. 7.

5″ × 4½″ × 18 lbs per foot.

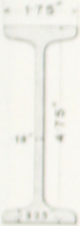


D.L.B. 6 A.

5″ × $4\frac{3}{16}$″ × 19 lbs per foot.

FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 46 & 47.

I BEAMS



B.S.B. 5.

4¾″ × 1¾″ × 6½ lbs per foot.

B.S.B. 4.

4″ × 3″ × 9½ lbs per foot.

D.L.B. 3A.

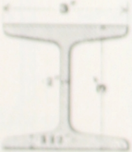
4″ × 1¾″ × 8 lbs per foot.

D.L.B. 1A.

3½″ × 1½″ × 6 lbs per foot.

B.S.B. 3.

4″ × 1¾″ × 5 lbs per foot.



B.S.B. 2.*

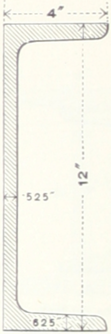
3″ × 3″ × 8½ lbs per foot.

B.S.B. 1.

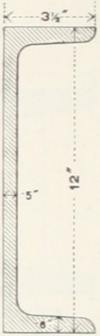
3″ × 1½″ × 4 lbs per foot.

FOR PROPERTIES & SAFE LOADS SEE PAGES 34, 35, 46 & 47.

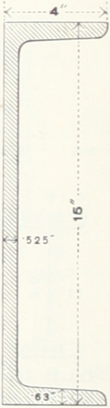
CHANNELS



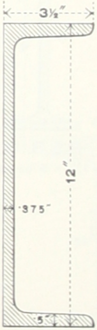
B.S.C. 26.
12" × 4" × 36·47 lbs per foot.



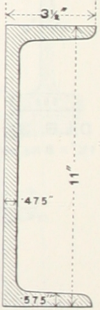
B.S.C. 25.
12" × 3½" × 32·88 lbs per foot.



B.S.C. 27.
15" × 4" × 41·94 lbs per foot.



B.S.C. 24.
12" × 3½" × 26·10 lbs per foot.

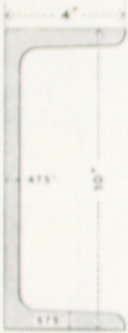


B.S.C. 22.
11" × 3½" × 29·82 lbs per foot.

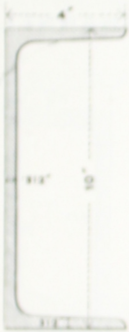
Each Section will be to correct profile for the weights given, but for increased weights the Section will be modified as indicated on page 32.

FOR TABLE OF PROPERTIES SEE PAGES 36 AND 37.

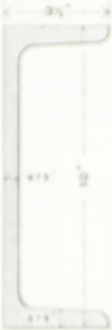
CHANNELS



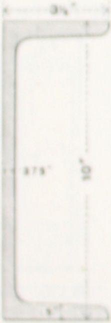
B.S.C. 21.
10″ × 4″ × 30·16 lbs per ft.



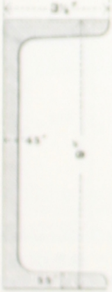
D.L.C. 21A.*
10″ × 4″ × 18·86 lbs per ft.



B.S.C. 20.
10″ × 3½″ × 28·21 lbs per ft.



B.S.C. 19.
10″ × 3½″ × 23·55 lbs per ft.



B.S.C. 17.
9″ × 3½″ × 25·39 lbs per ft.

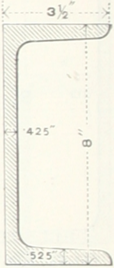
B.S.C. 16.
9″ × 3½″ × 22·27 lbs per ft.

Each Section will be to correct profile for the weights given, but for increased weights the Section will be modified as indicated on page 32.

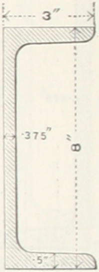
FOR TABLE OF PROPERTIES SEE PAGES 36 AND 37.

CHANNELS

B.S.C. 15.
9″×3″×19·37 lbs per ft.



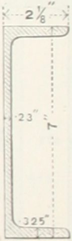
B.S.C. 13.
8″×3½″×22·72 lbs per ft.



B.S.C. 12.*
8″×3″×19·3 lbs per ft.

B.S.C. 10.
7″×3½″×20·23 lbs per ft.

B.S.C. 9.
7″×3″×17·56 lbs per ft.

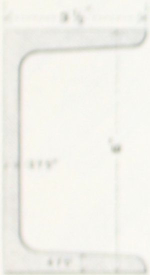


D.L.C. 9A.*
7″×2⅛″×9·75 lbs per ft.

Each Section will be to correct profile for the weights given, but for increased weights the Section will be modified as indicated on page 32.

FOR TABLE OF PROPERTIES SEE PAGES 36 AND 37.

CHANNELS



B.S.C. 8.
8" × 3½" × 17·9 lbs per ft.

B.S.C. 6.
6" × 3" × 14·49 lbs per ft.

D.L.C. 5A.
5½" × 2½" × 10·08 lbs per ft.

D.L.C. 4A.
4½" × 2" × 12·92 lbs per ft.

D.L.C. 3A.
4" × 3" × 14·20 lbs per ft.

D.L.C. 2A.
2½" × 1" × 4·14 lbs per ft.

Each Section will be to correct profile for the weights given, but for increased weights the Section will be modified as indicated on page 32.

FOR TABLE OF PROPERTIES SEE PAGES 36 AND 37.

UNEQUAL ANGLES

B.S.U.A. 25.
Thicknesses
½", ⅝", ¾".

B.S.U.A. 24.
Thicknesses
½", ⅝", ¾".

B.S.U.A. 22.
Thicknesses
⅜", ½", ⅝".

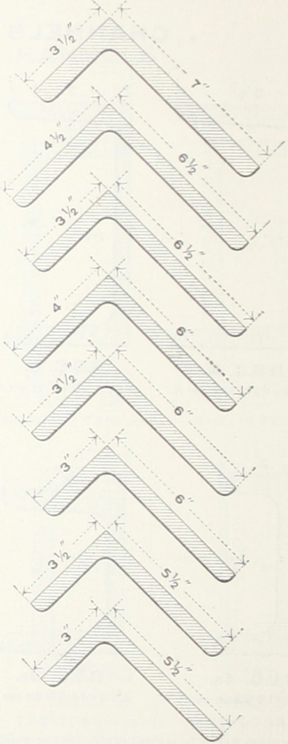
B.S.U.A. 21.
Thicknesses
⅜", ½" ⅝".

B.S.U.A. 20.
Thicknesses
⅜", ½", ⅝".

D.L.U.A. 20A.
Thicknesses
⅜", ½", ⅝".

B.S.U.A. 19.
Thicknesses
⅜", ½", ⅝".

B.S.U.A. 18.*
Thicknesses
⅜", ½", ⅝".



Each Section will be to correct profile for the thicknesses given, but for intermediate or greater thicknesses the Section will be modified as indicated on page 32.

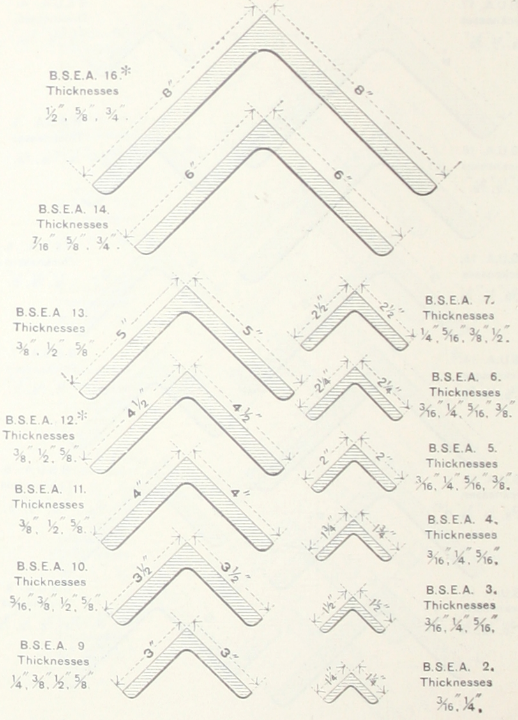
FOR TABLE OF PROPERTIES SEE PAGES 38 AND 39.

UNEQUAL ANGLES

Each Section will be in correct profile for the thicknesses given, but for intermediate or greater thicknesses the Section will be modified as indicated on page [illegible].

FOR TABLE OF PROPERTIES SEE PAGES [illegible] AND [illegible].

EQUAL ANGLES



Each Section will be to correct profile for the thicknesses given, but for intermediate or greater thicknesses the Sections will be modified as indicated on page 32.

FOR TABLE OF PROPERTIES SEE PAGE 40.

BULB ANGLES

B.S.B.A. 20.
12" × 4" × 36·46 lbs per ft.

B.S.B.A. 19.
11" × 3½" × 30·44 lbs per ft.

B.S.B.A. 18.
10" × 3½" × 26·87 lbs per ft.

B.S.B.A. 16.
9" × 3½" × 22·70 lbs per ft.

B.S.B.A. 14.
8½" × 3½" × 21·55 lbs per ft.

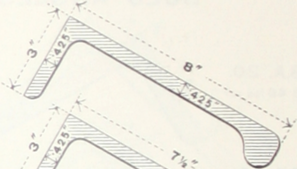
B.S.B.A. 12.
8" × 3½" × 19·65 lbs per ft.

Each Section will be to correct profile for the weights given, but for increased weights the Section will be modified as indicated on page 32.

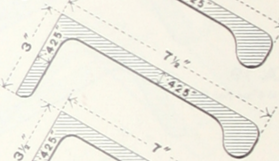
FOR TABLE OF PROPERTIES SEE PAGES 42 AND 43.

BULB ANGLES

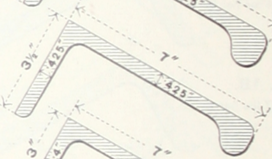
B.S.B.A. 11.
8″ × 3″ × 18·02 lbs per ft.



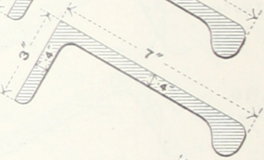
B.S.B.A. 9.
7½″ × 3″ × 17·08 lbs per ft.

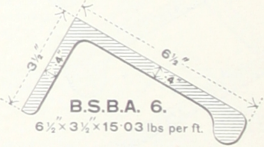


B.S.B.A. 8.
7″ × 3½″ × 16·8 lbs per ft.

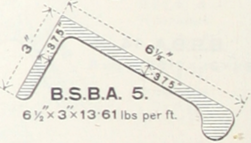


B.S.B.A. 7.
7″ × 3″ × 15·29 lbs per ft.

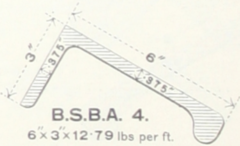




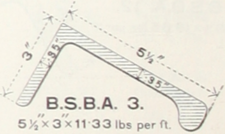
B.S.B.A. 6.
6½″ × 3½″ × 15·03 lbs per ft.



B.S.B.A. 5.
6½″ × 3″ × 13·61 lbs per ft.



B.S.B.A. 4.
6″ × 3″ × 12·79 lbs per ft.



B.S.B.A. 3.
5½″ × 3″ × 11·33 lbs per ft.

Each Section will be to correct profile for the weights given, but for increased weights the Section will be modified as indicated on page 32.

FOR TABLE OF PROPERTIES SEE PAGES 42 AND 43.

ZEDS

D.L.Z. 2A.
12·26 lbs per foot.

B.S.Z. 3.
14·17 lbs per foot.

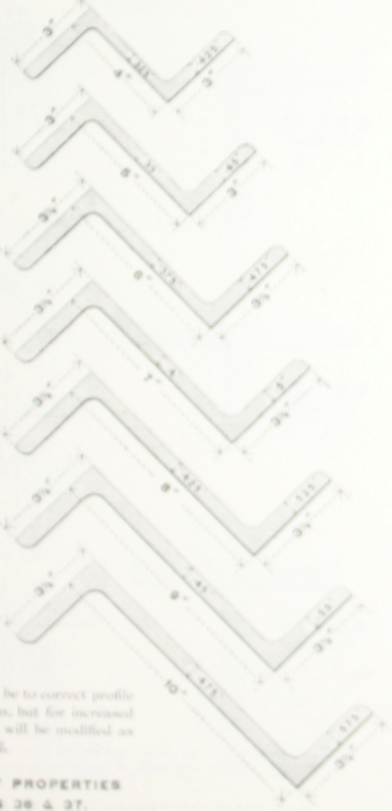
B.S.Z. 4.
17·88 lbs per foot.

B.S.Z. 5.
20·22 lbs per foot.

B.S.Z. 6.
22·68 lbs per foot.

B.S.Z. 7.
25·33 lbs per foot.

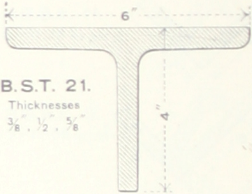
B.S.Z. 8.
28·16 lbs per foot.



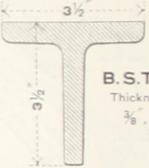
Each Section will be to correct profile for the weights given, but for increased weights the Section will be modified as indicated on page 32.

FOR TABLE OF PROPERTIES
SEE PAGES 36 & 37.

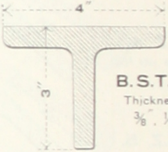
TEES



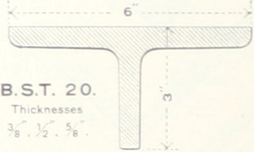
B.S.T. 21.
Thicknesses
3/8", 1/2", 5/8"



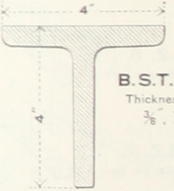
B.S.T. 13.
Thicknesses
3/8", 1/2".



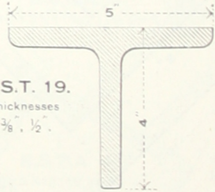
B.S.T. 14.
Thicknesses
3/8", 1/2".



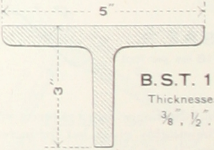
B.S.T. 20.
Thicknesses
3/8", 1/2", 5/8".



B.S.T. 15.
Thicknesses
3/8", 1/2".



B.S.T. 19.
Thicknesses
3/8", 1/2".



B.S.T. 17.
Thicknesses
3/8", 1/2".

Each Section will be to correct profile for the thicknesses given.
Table and stalk of equal thickness.

FOR TABLE OF PROPERTIES SEE PAGE 41.

TEES

B.S.T. 11.
Thicknesses
[illegible]

B.S.T. 3.
Thicknesses
[illegible]

B.S.T. 4.
Thicknesses
[illegible]

B.S.T. 10.
Thicknesses
[illegible]

B.S.T. 5.
Thicknesses
[illegible]

B.S.T. 8.
Thicknesses
[illegible]

D.L.T. 8A.
Thicknesses
[illegible]

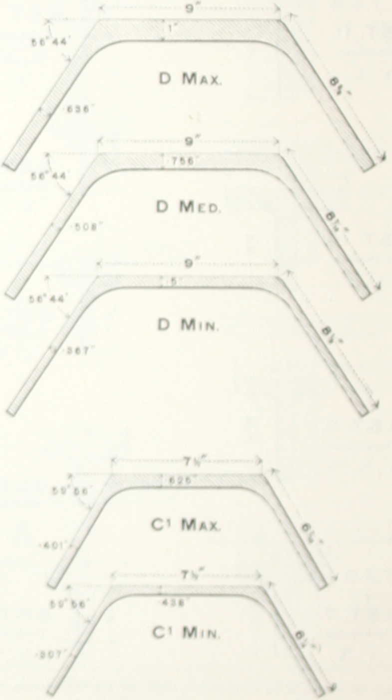
B.S.T. 7.
Thicknesses
[illegible]

B.S.T. 6.
Thicknesses
[illegible]

Each Section will be to correct profile for the thicknesses given.
Table and stalk of equal thickness.

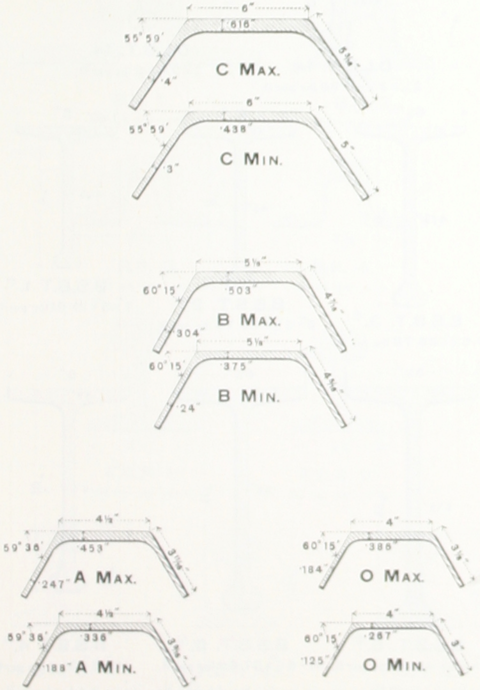
FOR TABLE OF PROPERTIES SEE PAGE 41.

STEEL TROUGHING



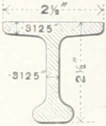
FOR ABOVE, BUILT UP AS FLOORING, SEE PAGES 126 TO 149.

STEEL TROUGHING

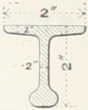


FOR ABOVE, BUILT UP AS FLOORING, SEE PAGES 123 TO 149.

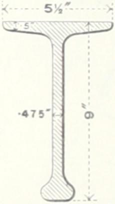
BULB TEES



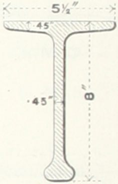
D.L.B.T. 1A.
2½" × 2½" × 5·98 lbs per ft.



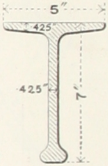
D.L.B.T. 1B.
2" × 2" × 3·2 lbs per ft.



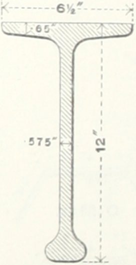
B.S.B.T. 3.*
9" × 5½" × 26·76 lbs per ft.



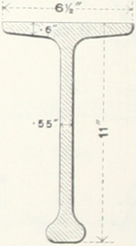
B.S.B.T. 2.*
8" × 5½" × 22·78 lbs per ft.



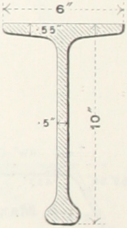
B.S.B.T 1.*
7" × 5" × 19·01 lbs per ft.



B.S.B.T. 6.*
12" × 6½" × 42·49 lbs per ft.



B.S.B.T. 5.*
11" × 6½" × 37·86 lbs per ft.



B.S.B.T 4.*
10" × 6" × 31·6 lbs per ft.

Each Section will be to correct profile for the weights given, but for increased weights the Section will be modified as indicated on page 32.

FOR TABLE OF PROPERTIES SEE PAGES 42 AND 43.

RAILS

B.R. 1.
56 lbs. per yard.

B.R. 2.
24 lbs. per yard.

B.R. 3.
18 lbs. per yard.

B.R. 4.
16 lbs. per yard.

F.B.R. 1.
24 lbs. per yard.

F.B.R. 2.
22½ lbs. per yard.

F.B.R. 3.
18 lbs. per yard.

F.B.R. 4.
16 lbs. per yard.

F.B.R. 5.
16 lbs. per yard.

DORMAN, LONG & CO. LIMITED.

ROUNDS, SQUARES AND FLATS.

ROUNDS.

DIAMETERS.

½″	$\frac{9}{16}$″	⅝″	$\frac{11}{16}$″	¾″
$\frac{13}{16}$″	⅞″	$\frac{15}{16}$″	1″	$1\frac{1}{16}$″
1⅛″	$1\frac{3}{16}$″	1¼″	$1\frac{5}{16}$″	1⅜″
$1\frac{7}{16}$″	1½″	1⅝″	1¾″	1⅞″
2″	2⅛″	2¼″	2⅜″	2½″

SQUARES.

SIDES.

½″	$\frac{9}{16}$″	⅝″	$\frac{11}{16}$″	¾″
$\frac{13}{16}$″	⅞″	$\frac{15}{16}$″	1″	$1\frac{1}{16}$″
1⅛″	$1\frac{3}{16}$″	1¼″	$1\frac{5}{16}$″	1⅜″
$1\frac{7}{16}$″	1½″	1⅝″	1¾″	1⅞″
2″	2⅛″	2¼″		

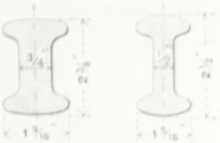
FLATS.

Width Inches	Thickness Minimum	Thickness Maximum	Width Inches	Thickness Minimum	Thickness Maximum
24	$\frac{5}{16}$	⅝	3½	¼	¾
20¼	$\frac{5}{16}$	⅝	3¼	¼	¾
18	⅜	¾	3	¼	¾
16	⅜	¾	2¾	¼	¾
14	⅜	¾	2½	¼	¾
13	⅜	¾	2¼	¼	¾
12	⅜	¾	2	¼	¾
10	⅜	¾	1¾	¼	⅝
9	⅜	¾	1½	¼	½
8	⅜	¾	1¼	¼	½
4	¼	¾	1	¼	½
3¾	¼	¾	...	...	...

NOTE.—Flats of greater thickness than the above will have the edges slightly rounded

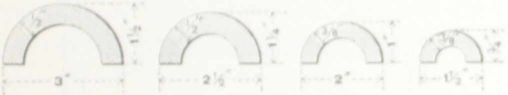
MISCELLANEOUS SECTIONS

No. 3 HATCH.

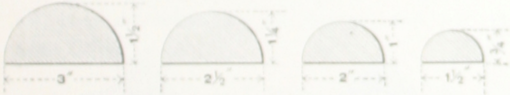


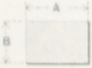
BOBBIN SECTIONS.

HOLLOW HALF ROUNDS.



SOLID HALF ROUNDS.





NUT STEEL.

Sizes

A × B	A × B
1 11/16" × 1 3/16"	1 3/8" × ¾"
1 9/16" × ¾"	1 5/16" × ¾"
1 7/16" × ¾"	1 ¼" × ¾"
1 ½" × 1"	1 3/16" × 1"

FENCING STANDARD.

2" × ½" × 3/8"

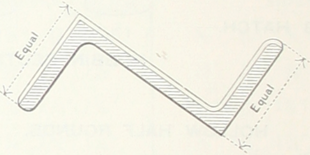
RIVET BARS.

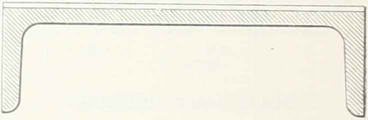
Diameters

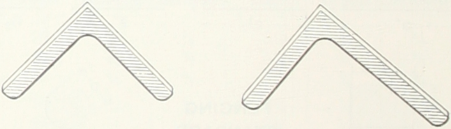
½"	23/32"	29/32"	1 ¼"
9/16"	¾"	15/16"	1 3/8"
19/32"	25/32"	31/32"	1 ½"
5/8"	13/16"	1"	1 5/8"
21/32"	27/32"	1 1/8"	1 ¾"
11/16"	7/8"		

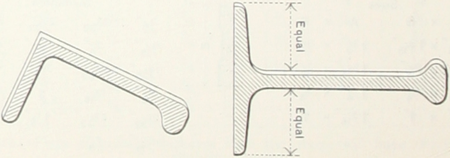
DIAGRAM SHEWING PROFILES OBTAINED WHEN SECTIONS ARE ROLLED OF THICKNESSES OTHER THAN THOSE GIVEN ON THE PRECEDING PAGES.

The hatched portions indicate correct profiles, the blank portions the added material.









DIMENSIONS, PROPERTIES, &c., OF SECTIONS.

Dimensions and Properties.—Complete tables are given of dimensions and properties of the various sections illustrated.

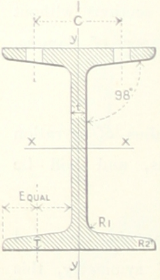
The areas and properties have been carefully calculated on correct profiles, and full sections without holing; all fillets, rounded corners, taper of flanges, &c., being taken into consideration.

Least Radius of Gyration.—The least radius of gyration has been determined for all sections, and will be found in the tables.

In sections such as I beams, channels, tees and equal angles, which have an axis of symmetry, this radius is either about that axis or one at right angles to it. In the case of unequal angles, bulb angles and zed bars, having no axis of symmetry, the position of the axis, about which the radius is least, has been calculated and is given in the tables; this axis being marked in the diagram "minor axis."

DIMENSIONS AND PROPERTIES OF I BEAMS.

For safe distributed loads see pages 46 and 47.



Reference Mark	Size Inches	Weight per Foot lbs.	DIAGRAM Web t	Flange T	Radius R1	Radius R2
BSB 30	24×7½	100	·6	1·07	·7	·35
" 29	20×7½	89	·6	1·01	·7	·35
" 28	18×7	75	·55	·928	·65	·325
" 27	16×6	62	·55	·847	·65	·325
" 26	15×6	59	·5	·88	·6	·3
" 25	15×5	42	·42	·647	·52	·26
" 24	14×6	57	·5	·873	·6	·3
" 23	14×6	46	·4	·698	·5	·25
" 22	12×6	54	·5	·883	·6	·3
" 21	12×6	44	·4	·717	·5	·25
DLB 20A	12×5	39	·44	·664	·54	·27
BSB 20	12×5	32	·35	·55	·45	·225
" 19	10×8	70	·6	·97	·7	·35
" 18	10×6	42	·4	·736	·5	·25
DLB 17A	10×5	35	·42	·652	·52	·26
BSB 17	10×5	30	·36	·552	·46	·23
" 16	9×7	58	·55	·924	·65	·325
DLB 15A*	9¼×3¾	21·5	·34	·453	·44	·22
BSB 15	9×4	21	·3	·46	·4	·2
" 14	8×6	35	·44	·597	·54	·27
" 13	8×5	28	·35	·575	·45	·225
DLB 12A	8×4	25	·38	·581	·48	·24
BSB 12	8×4	18	·28	·402	·38	·19
" 11	7×4	16	·25	·387	·35	·175
" 10	6×5	25	·41	·52	·51	·255
" 9	6×4½	20	·37	·431	·47	·235
DLB 8A	6×3	16	·34	·484	·44	·22
BSB 8	6×3	12	·26	·348	·36	·18
DLB 7A*	5×5	24	·37	·551	·47	·235
BSB 7	5×4½	18	·29	·448	·39	·195
DLB 6A	5×4$\frac{3}{16}$	19	·40	·458	·50	·25
BSB 6	5×3	11	·22	·376	·32	·16
DLB 5A	4¾×1¾	10	·32	·48	·32	·16
BSB 5	4¾×1¾	6·5	·18	·325	·28	·14
" 4	4×3	9·5	·22	·336	·32	·16
DLB 3A	4×1¾	8	·3	·383	·3	·15
BSB 3	4×1¾	5	·17	·24	·27	·135
" 2*	3×3	8·5	·2	·332	·3	·15
DLB 1A	3½×1½	6	·25	·344	·25	·125
BSB 1	3×1½	4	·16	·248	·26	·13

The properties of British Standard Sections in above table are published by permission of the Engineering Standards Committee.

DORMAN, LONG & CO. LIMITED.

DIMENSIONS AND PROPERTIES OF I BEAMS.

For safe distributed loads see pages 46 and 47.

Area Square Inches	Moments of Inertia		Radii of Gyration Inches		Section Modulus	Centres of Holes C Inches	Reference Mark
	About X-X	About Y-Y	About X-X	About Y-Y	About X-X		
29·4	2654	66·92	9·5	1·5	221·1	4·5	BSB 30
26·17	1670	62·63	7·99	1·54	167·0	4·5	„ 29
22·06	1149	47·04	7·21	1·46	127·6	4·0	„ 28
18·23	725·7	27·08	6·31	1·21	90·71	3·5	„ 27
17·35	628·9	28·22	6·02	1·27	83·85	3·5	„ 26
12·35	428·	11·81	5·88	·978	57·06	2·75	„ 25
16·76	532·9	27·96	5·63	1·29	76·12	3·5	„ 24
13·53	440·5	21·6	5·7	1·26	62·92	3·5	„ 23
15·88	375·5	28·3	4·86	1·33	62·58	3·5	„ 22
12·94	315·3	22·27	4·93	1·31	52·55	3·5	„ 21
11·47	260·9	12·16	4·77	1·03	43·48	2·75	DLB 20A
9·41	220·	9·753	4·83	1·01	36·66	2·75	BSB 20
20·6	344·9	71·67	4·09	1·86	68·98	4·75	„ 19
12·35	211·5	22·95	4·13	1·36	42·3	3·5	„ 18
10·29	167·2	11·89	4·03	1·07	33·45	2·75	DLB 17A
8·82	145·6	9·79	4·06	1·05	29·12	2·75	BSB 17
17·06	229·5	46·3	3·66	1·64	51·0	4·0	„ 16
6·324	83·41	3·446	3·63	·738	18·03	2·0	DLB 15A*
6·176	81·1	4·2	3·62	·824	18·02	2·25	BSB 15
10·29	110·5	17·95	3·27	1·32	27·62	3·5	„ 14
8·24	89·32	10·26	3·29	1·11	22·33	2·75	„ 13
7·353	75·06	5·502	3·19	·865	18·77	2·25	DLB 12A
5·294	55·69	3·578	3·24	·822	13·92	2·25	BSB 12
4·706	39·21	3·414	2·88	·851	11·2	2·25	„ 11
7·35	43·61	9·116	2·43	1·11	14·53	2·75	„ 10
5·88	34·62	5·415	2·42	·959	11·54	2·5	„ 9
4·706	26·16	1·957	2·36	·645	8·718	1·5	DLB 8A
3·53	20·21	1·339	2·39	·616	6·736	1·5	BSB 8
7·059	29·30	9·751	2·04	1·18	11·72	2·75	DLB 7A*
5·29	22·69	5·664	2·07	1·03	9·076	2·5	BSB 7
5·588	22·34	4·756	2·00	·923	8·937	2·25	DLB 6A
3·235	13·61	1·462	2·05	·672	5·444	1·5	BSB 6
2·941	9·275	·413	1·78	·375	3·905	..	DLB 5A
1·912	6·73	·263	1·87	·37	2·833	..	BSB 5
2·794	7·52	1·281	1·64	·677	3·76	1·5	„ 4
2·353	5·328	·324	1·50	·371	2·664	..	DLB 3A
1·47	3·668	·186	1·58	·355	1·834	..	BSB 3
2·5	3·787	1·262	1·23	·71	2·524	1·5	„ 2*
1·765	3·086	·183	1·32	·322	1·763	..	DLB 1A
1·176	1·659	·124	1·18	·324	1·106	..	BSB 1

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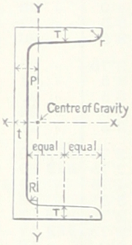
CHANNELS.

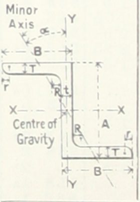
DIMENSIONS AND PROPERTIES.



Reference Mark		Size A × B	Standard Thicknesses t	Standard Thicknesses T	Radii R	Radii r	Weight per foot—lbs.
BSC	27	15 × 4	·525	·630	·630	·440	41·94
"	26	12 × 4	·525	·625	·625	·425	36·47
"	25	12 × 3½	·500	·600	·600	·425	32·88
"	24	12 × 3½	·375	·500	·500	·350	26·10
"	22	11 × 3½	·475	·575	·575	·400	29·82
"	21	10 × 4	·475	·575	·575	·400	30·16
DLC	21A*	10 × 4	·312	·312	·600	·200	18·86
BSC	20	10 × 3½	·475	·575	·575	·400	28·21
"	19	10 × 3½	·375	·500	·500	·350	23·55
"	17	9 × 3½	·450	·550	·550	·375	25·39
"	16	9 × 3½	·375	·500	·500	·350	22·27
"	15	9 × 3	·375	·437	·437	·350	19·37
"	13	8 × 3½	·425	·525	·525	·375	22·72
"	12*	8 × 3	·375	·500	·500	·350	19·30
"	10	7 × 3½	·400	·500	·500	·350	20·23
"	9	7 × 3	·375	·475	·475	·325	17·56
DLC	9A*	7 × 2⅛	·230	·325	·325	·230	9·75
BSC	8	6 × 3½	·375	·475	·475	·325	17·9
"	6	6 × 3	·312	·437	·437	·300	14·49
DLC	5A	5⅛ × 2⅞	·437	·500	·500	·350	16·08
"	4A	4½ × 2	·500	·500	·500	·350	12·92
"	3A	4 × 3	·375	·500	·500	·350	14·20
"	2A	2½ × 1	·312	·312	·250	·200	4·14

ZED BARS.

DIMENSIONS AND PROPERTIES.



Reference Mark		Size A × B	Standard Thicknesses t	Standard Thicknesses T	Area square inches	Weight per foot—lbs.
BSZ	8	10 × 3½	·475	·575	8·283	28·16
"	7	9 × 3½	·450	·550	7·449	25·33
"	6	8 × 3½	·425	·525	6·670	22·68
"	5	7 × 3½	·400	·500	5·948	20·22
"	4	6 × 3½	·375	·475	5·258	17·88
"	3	5 × 3	·350	·450	4·169	14·17
DLZ	2A	4 × 3	·325	·425	3·605	12·26

The properties of British Standard Sections in above tables, where taken from the Engineering Standards Committee's Section Book, are published by permission of the Committee.

CHANNELS.

DIMENSIONS AND PROPERTIES.

Area square inches	y Dimension	Moments of Inertia		Section Moduli		Radii of Gyration inches		Reference Mark
		About XX	About YY	About XX	About YY	About XX	About YY	
12·334	·935	377·0	14·55	50·27	4·748	5·53	1·09	BSC 27
10·727	1·031	218·2	13·65	36·36	4·599	4·51	1·13	,, 26
9·671	·867	190·7	8·922	31·79	3·389	4·44	·960	,, 25
7·675	·860	158·6	7·572	26·44	2·868	4·55	·993	,, 24
8·771	·896	148·6	8·421	27·02	3·234	4·12	·980	,, 22
8·871	1·102	130·7	12·02	26·14	4·147	3·84	1·16	,, 21
5·548	·929	82·58	7·136	16·52	2·324	3·86	1·13	DLC 21A*
8·296	·933	117·9	8·194	23·59	3·192	3·77	·994	BSC 20
6·925	·933	102·6	7·187	20·52	2·800	3·85	1·02	,, 19
7·469	·971	88·07	7·660	19·57	3·029	3·43	1·01	,, 17
6·550	·976	79·90	6·963	17·76	2·759	3·49	1·03	,, 16
5·696	·754	65·18	4·021	14·48	1·790	3·38	·840	,, 15
6·682	1·011	62·76	7·067	15·94	2·839	3·09	1·03	,, 13
5·675	·844	53·43	4·329	13·36	2·008	3·07	·873	,, 12*
5·950	1·061	44·55	6·498	12·73	2·664	2·74	1·04	,, 10
5·166	·874	37·63	4·017	10·75	1·889	2·70	·882	,, 9
2·863	·547	20·48	1·069	5·852	·677	2·67	·611	DLC 9A*
5·266	1·119	29·66	5·907	9·885	2·481	2·36	1·06	BSC 8
4·261	·938	24·01	3·508	8·002	1·699	2·37	·907	,, 6
4·728	·922	18·13	3·385	7·075	1·733	1·96	·846	DLC 5A
3·800	·627	9·923	1·069	4·410	·779	1·62	·530	,, 4A
4·175	1·081	10·15	3·432	5·076	1·788	1·56	·907	,, 3A
1·218	·325	·927	·085	·742	·126	·872	·264	,, 2A

ZED BARS.

DIMENSIONS AND PROPERTIES.

Radii—inches		Moments of Inertia		Section Moduli		Angle θ Degrees	Least Radius of Gyration inches	Reference Mark
R	r	About XX	About YY	About XX	About YY			
·500	·350	117·865	12·876	23·573	3·947	14	·839	BSZ 8
·475	·350	87·889	12·418	19·531	3·792	16½	·842	,, 7
·450	·325	63·729	12·024	15·932	3·657	19½	·845	,, 6
·450	·300	44·609	11·618	12·745	3·521	23	·840	,, 5
·425	·300	29·660	11·134	9·887	3·361	28½	·821	,, 4
·375	·250	16·145	6·578	6·458	2·328	29½	·698	,, 3
·350	·225	9·093	6·317	4·546	2·226	38½	·651	DLZ 2A

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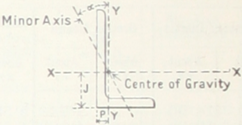
UNEQUAL ANGLES.

DIMENSIONS AND PROPERTIES.



Reference Mark	Size and Thickness	Area Square Inches	Weight per Foot—Lbs.	Radii		Dimensions		Moments of Inertia		Section Moduli		Angle α Degrees	Least Radius of Gyration
				Root	Toe	J	P	About XX	About YY	About XX	About YY		
BSUA 25	7 × 3½ × ½	5·0	17·00	·425	·300	2·50	·764	25·1	4·22	5·58	1·56	14½	·74
" 25	" " ⅝	6·172	20·98	·425	·300	2·55	·814	30·55	5·15	6·86	1·92	14½	·74
" 25	" " ¾	7·313	24·86	·425	·300	2·60	·862	35·68	5·95	8·11	2·26	14	·73
" 24	6½ × 4½ × ½	5·248	17·84	·45	·325	2·08	1·09	22·2	8·75	5·02	2·57	25	·97
" 24	" " ⅝	6·482	22·04	·45	·325	2·13	1·14	27·09	10·60	6·20	3·15	25	·96
" 24	" " ¾	7·686	26·13	·45	·325	2·18	1·19	31·66	12·32	7·33	3·72	25	·96
" 22	6½ × 3½ × ⅜	3·610	12·27	·425	·300	2·22	·741	15·7	3·27	3·67	1·18	16½	·75
" 22	" " ½	4·750	16·15	·425	·300	2·28	·792	20·4	4·20	4·83	1·55	16½	·75
" 22	" " ⅝	5·860	19·92	·425	·300	2·33	·841	24·83	5·06	5·95	1·90	16	·74
" 21	6 × 4 × ⅜	3·610	12·27	·425	·300	1·91	·923	13·2	4·73	3·23	1·54	23½	·87
" 21	" " ½	4·750	16·15	·425	·300	1·96	·974	17·1	6·10	4·23	2·02	23½	·86
" 21	" " ⅝	5·860	19·92	·425	·300	2·02	1·02	20·8	7·36	5·23	2·47	23½	·86
" 20	6 × 3½ × ⅜	3·424	11·64	·40	·275	2·01	·773	12·6	3·22	3·16	1·18	19	·76
" 20	" " ½	4·502	15·31	·40	·275	2·06	·823	16·4	4·14	4·16	1·55	19	·75
" 20	" " ⅝	5·549	18·87	·40	·275	2·11	·872	19·88	4·97	5·11	1·89	18½	·75
DLUA 20A	6 × 3 × ⅜	3·236	11·00	·40	·275	2·12	·632	12·0	2·05	3·09	·87	14½	·64
" 20A	" " ½	4·252	14·46	·40	·275	2·17	·683	15·5	2·62	4·05	1·13	14½	·63
" 20A	" " ⅝	5·236	17·80	·40	·275	2·22	·731	18·79	3·13	4·97	1·38	14	·63
BSUA 19	5½ × 3½ × ⅜	3·236	11·00	·40	·275	1·80	·807	9·93	3·15	2·68	1·17	22	·76
" 19	" " ½	4·252	14·46	·40	·275	1·85	·857	12·80	4·05	3·51	1·53	22	·75
" 19	" " ⅝	5·236	17·80	·40	·275	1·90	·905	15·6	4·86	4·33	1·87	21½	·75
" 18*	5½ × 3 × ⅜	3·050	10·37	·375	·250	1·90	·662	9·45	2·02	2·62	·86	17	·64
" 18*	" " ½	4·003	13·61	·375	·250	1·95	·711	12·2	2·58	3·44	1·13	16½	·64
" 18*	" " ⅝	4·925	16·74	·375	·250	2·00	·759	14·7	3·08	4·20	1·37	16½	·63
" 17	5 × 4 × ⅜	3·236	11·00	·40	·275	1·51	1·01	7·96	4·53	2·28	1·52	32	·85
" 17	" " ½	4·252	14·46	·40	·275	1·56	1·06	10·3	5·82	2·99	1·98	32	·84
" 17	" " ⅝	5·236	17·80	·40	·275	1·60	1·11	12·4	7·01	3·66	2·43	32	·83
" 16	5 × 3½ × ⅜	3·050	10·37	·375	·250	1·59	·848	7·64	3·09	2·24	1·17	25½	·75
" 16	" " ½	4·003	13·61	·375	·250	1·64	·897	9·86	3·96	2·93	1·52	25½	·75
" 16	" " ⅝	4·925	16·74	·375	·250	1·69	·944	11·9	4·75	3·60	1·86	25	·74

UNEQUAL ANGLES.

DIMENSIONS AND PROPERTIES.

Reference Mark	Size and Thickness	Area Square Inches	Weight per Foot—Lbs.	Radii		Dimensions		Moments of Inertia		Section Moduli		Angle α Degrees	Least Radius of Gyration
				Root	Toe	J	P	About XX	About YY	About XX	About YY		
BSUA 15	5 × 3 × 5/16	2·402	8·17	·350	·250	1·66	·667	6·14	1·68	1·84	·72	20	·65
" 15	" " 3/8	2·859	9·72	·350	·250	1·68	·693	7·24	1·97	2·18	·85	19½	·65
" 15	" " ½	3·749	12·75	·350	·250	1·73	·742	9·33	2·51	2·85	1·11	19½	·64
" 15	" " 5/8	4·609	15·67	·350	·250	1·78	·789	11·25	3·00	3·49	1·36	19	·64
" 14*	4½ × 3½ × 5/16	2·402	8·17	·350	·250	1·36	·866	4·82	2·55	1·54	·97	30½	·74
" 14*	" " 3/8	2·859	9·72	·350	·250	1·39	·891	5·69	3·00	1·83	1·15	30½	·74
" 14*	" " ½	3·749	12·75	·350	·250	1·44	·940	7·31	3·84	2·39	1·5	30	·74
" 14*	" " 5/8	4·609	15·67	·350	·250	1·48	·987	8·81	4·61	2·92	1·83	30	·74
" 12	4 × 3½ × 5/16	2·246	7·64	·350	·250	1·16	·915	3·46	2·47	1·22	·96	37	·72
" 12	" " 3/8	2·671	9·08	·350	·250	1·19	·941	4·08	2·90	1·45	1·13	37	·72
" 12	" " ½	3·499	11·90	·350	·250	1·24	·990	5·23	3·71	1·89	1·48	37	·71
" 12	" " 5/8	4·296	14·61	·350	·250	1·28	1·04	6·28	4·44	2·31	1·80	36½	·71
" 11	4 × 3 × 5/16	2·091	7·11	·325	·225	1·24	·746	3·31	1·59	1·20	·71	28½	·64
" 11	" " 3/8	2·485	8·45	·325	·225	1·27	·771	3·89	1·87	1·42	·84	28½	·64
" 11	" " ½	3·251	11·05	·325	·225	1·31	·819	4·98	2·37	1·85	1·09	28½	·63
" 11	" " 5/8	3·985	13·55	·325	·225	1·36	·865	5·96	2·83	2·26	1·33	28	·63
" 9	3½ × 3 × 5/16	1·934	6·58	·325	·225	1·04	·792	2·27	1·53	·92	·69	35½	·62
" 9	" " 3/8	2·298	7·81	·325	·225	1·07	·819	2·67	1·80	1·10	·83	35½	·62
" 9	" " ½	3·001	10·20	·325	·225	1·11	·867	3·40	2·28	1·42	1·07	35½	·61
" 9	" " 5/8	3·673	12·49	·325	·225	1·16	·912	4·05	2·71	1·73	1·30	35	·61
" 8	3½ × 2½ × 5/16	1·779	6·05	·30	·20	1·12	·627	2·15	·910	·90	·49	26½	·54
" 8	" " 3/8	2·111	7·18	·30	·20	1·15	·652	2·52	1·06	1·07	·57	26	·53
" 8	" " ½	2·752	9·36	·30	·20	1·20	·699	3·20	1·34	1·39	·74	26	·53
" 7	3 × 2½ × ¼	1·312	4·46	·275	·20	·895	·648	1·14	·716	·54	·39	34	·52
" 7	" " 3/8	1·921	6·53	·275	·20	·945	·697	1·62	1·02	·79	·57	34	·52
" 7	" " ½	2·499	8·50	·275	·20	·992	·744	2·05	1·28	1·02	·73	33½	·52
" 6	3 × 2 × ¼	1·187	4·04	·275	·20	·976	·482	1·06	·373	·52	·25	23½	·43
" 6	" " 3/8	1·733	5·89	·275	·20	1·03	·532	1·50	·525	·76	·36	23	·42
" 6	" " ½	2·249	7·65	·275	·20	1·07	·578	1·89	·656	·98	·46	22½	·42
" 5	2½ × 2 × ¼	1·063	3·61	·250	·175	·774	·527	·636	·359	·37	·24	32	·42
" 5	" 2 5/16	1·309	4·45	·250	·175	·799	·552	·770	·433	·45	·30	31½	·42
" 5	" 2 3/8	1·547	5·26	·250	·175	·823	·575	·895	·502	·53	·35	31½	·42
" 4	2 × 1½ × 3/16	·622	2·11	·225	·150	·627	·381	·240	·115	·17	·10	28½	·32
" 4	" " ¼	·814	2·77	·225	·150	·653	·407	·308	·146	·23	·13	28	·31
" 4	" " 5/16	·997	3·39	·225	·150	·678	·431	·369	·174	·28	·16	28	·31

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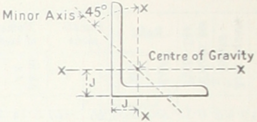
EQUAL ANGLES.

DIMENSIONS AND PROPERTIES.



Reference Mark	Size and Thickness	Area Square Inches	Weight per Foot Lbs.	Radii Root	Radii Toe	Dimension J	Moment of Inertia xx	Section Mod'lus xx	Least Radius of Gyrt'n
BSEA 16*	8 × 8 × ½	7·75	26·35	·600	·425	2·15	47·4	8·10	1·58
" 16*	" " ⅝	9·609	32·67	·600	·425	2·20	58·2	10·03	1·57
" 16*	" " ¾	11·437	38·89	·600	·425	2·25	68·5	11·91	1·56
" 14	6 × 6 × 7/16	5·062	17·21	·475	·325	1·64	17·3	3·97	1·18
" 14	" " ⅝	7·112	24·18	·475	·325	1·71	23·8	5·55	1·18
" 14	" " ¾	8·441	28·70	·475	·325	1·76	27·8	6·56	1·17
" 13	5 × 5 × ⅜	3·610	12·27	·425	·300	1·37	8·51	2·34	·98
" 13	" " ½	4·750	16·15	·425	·300	1·42	11·0	3·07	·98
" 13	" " ⅝	5·860	19·92	·425	·300	1·47	13·4	3·80	·98
" 12*	4½ × 4½ × ⅜	3·236	11·00	·400	·275	1·22	6·14	1·87	·88
" 12*	" " ½	4·252	14·46	·400	·275	1·29	7·92	2·47	·87
" 12*	" " ⅝	5·236	17·80	·400	·275	1·34	9·56	3·03	·87
" 11	4 × 4 × ⅜	2·859	9·72	·350	·250	1·12	4·26	1·48	·78
" 11	" " ½	3·749	12·75	·350	·250	1·17	5·46	1·93	·77
" 11	" " ⅝	4·609	15·67	·350	·250	1·22	6·56	2·36	·77
" 10	3½ × 3½ × 5/16	2·091	7·11	·325	·225	·975	2·39	·95	·68
" 10	" " ⅜	2·485	8·45	·325	·225	1·00	2·80	1·12	·68
" 10	" " ½	3·251	11·05	·325	·225	1·05	3·57	1·46	·68
" 10	" " ⅝	3·985	13·55	·325	·225	1·09	4·27	1·77	·68
" 9	3 × 3 × ¼	1·44	4·90	·300	·200	·827	1·21	·56	·59
" 9	" " ⅜	2·111	7·18	·300	·200	·877	1·72	·81	·58
" 9	" " ½	2·752	9·36	·300	·200	·924	2·19	1·05	·58
" 9	" " ⅝	3·362	11·43	·300	·200	·970	2·59	1·28	·58
" 7	2½ × 2½ × ¼	1·187	4·04	·275	·200	·703	·677	·38	·48
" 7	" " 5/16	1·464	4·98	·275	·200	·728	·822	·46	·48
" 7	" " ⅜	1·733	5·89	·275	·200	·752	·962	·55	·48
" 7	" " ½	2·249	7·65	·275	·200	·799	1·21	·71	·48
" 6	2¼ × 2¼ × 3/16	·809	2·75	·250	·175	·616	·378	·23	·44
" 6	" " ¼	1·063	3·61	·250	·175	·643	·489	·30	·44
" 6	" " 5/16	1·309	4·45	·250	·175	·668	·592	·37	·43
" 6	" " ⅜	1·547	5·26	·250	·175	·692	·686	·44	·43
" 5	2 × 2 × 3/16	·715	2·43	·250	·175	·554	·260	·18	·39
" 5	" " ¼	·938	3·19	·250	·175	·581	·336	·24	·39
" 5	" " 5/16	1·153	3·92	·250	·175	·605	·401	·29	·38
" 5	" " ⅜	1·36	4·62	·250	·175	·629	·467	·34	·38
" 4	1¾ × 1¾ × 3/16	·622	2·11	·225	·150	·495	·172	·14	·34
" 4	" " ¼	·814	2·77	·225	·150	·520	·220	·18	·34
" 4	" " 5/16	·997	3·39	·225	·150	·544	·264	·22	·34
" 3	1½ × 1½ × 3/16	·526	1·79	·200	·150	·434	·105	·10	·29
" 3	" " ¼	·686	2·33	·200	·150	·458	·134	·13	·29
" 3	" " 5/16	·839	2·85	·200	·150	·482	·153	·16	·29
" 2	1¼ × 1¼ × 3/16	·433	1·47	·200	·150	·371	·058	·07	·24
" 2	" " ¼	·561	1·91	·200	·150	·396	·073	·09	·23

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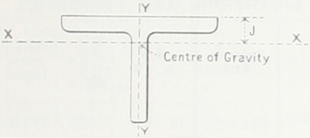
TEES.

DIMENSIONS AND PROPERTIES.



Reference Mark	Size and Thickness	Area Square Inches	Weight per foot—lbs.	Radii		J Dimension	Moments of Inertia		Section Moduli		Radii of Gyration	
				Table Root	Table Toe		About XX	About YY	About XX	About YY	About XX	About YY
BST 21	6 ×4 ×3/8	3·634	12·36	·425	·300	·915	4·700	6·344	1·52	2·11	1·137	1·321
" 21	" " 1/2	4·771	16·22	·425	·300	·968	6·070	8·621	2·00	2·87	1·128	1·344
" 21	" " 5/8	5·878	19·99	·425	·300	1·02	7·350	10·912	2·47	3·64	1·118	1·362
" 20	6 ×3 ×3/8	3·260	11·08	·400	·275	·633	2·062	6·389	·87	2·13	·795	1·400
" 20	" " 1/2	4·272	14·53	·400	·275	·684	2·635	8·649	1·14	2·88	·785	1·423
" 20	" " 5/8	5·256	17·87	·400	·275	·732	3·144	10·938	1·39	3·65	·773	1·443
" 19	5 ×4 ×3/8	3·257	11·07	·400	·275	·998	4·471	3·691	1·49	1·48	1·172	1·065
" 19	" " 1/2	4·268	14·51	·400	·275	1·05	5·772	5·017	1·96	2·01	1·163	1·084
" 17	5 ×3 ×3/8	2·875	9·78	·350	·250	·691	1·973	3·716	·85	1·49	·828	1·137
" 17	" " 1/2	3·762	12·79	·350	·250	·741	2·516	5·031	1·11	2·01	·818	1·156
" 15	4 ×4 ×3/8	2·872	9·77	·350	·250	1·11	4·189	1·901	1·45	·95	1·208	·814
" 15	" " 1/2	3·758	12·78	·350	·250	1·16	5·402	2·590	1·90	1·29	1·199	·830
" 14	4 ×3 ×3/8	2·498	8·49	·325	·225	·767	1·860	1·914	·83	·96	·863	·875
" 14	" " 1/2	3·262	11·08	·325	·225	·816	2·365	2·599	1·08	1·30	·851	·893
" 13	3½×3½×3/8	2·496	8·49	·325	·225	·988	2·768	1·284	1·10	·73	1·053	·717
" 13	" " 1/2	3·259	11·08	·325	·225	1·04	3·543	1·752	1·44	1·00	1·043	·733
" 11	3 ×3 ×3/8	2·121	7·21	·300	·200	·868	1·708	·816	·80	·54	·897	·620
" 11	" " 1/2	2·76	9·38	·300	·200	·918	2·165	1·115	1·04	·74	·886	·636
" 10	3 ×2½×3/8	1·929	6·56	·275	·200	·695	1·015	·814	·56	·54	·725	·650
" 10	" " 1/2	2·506	8·52	·275	·200	·742	1·275	1·109	·73	·74	·713	·665
" 8	2½×2½×1/4	1·197	4·07	·275	·200	·697	·677	·302	·38	·24	·752	·502
" 8	" " 5/16	1·474	5·01	·275	·200	·724	·823	·387	·46	·31	·747	·512
" 8	" " 3/8	1·742	5·92	·275	·200	·750	·959	·473	·55	·38	·742	·521
" 7	2¼×2¼×1/4	1·071	3·64	·250	·175	·638	·488	·224	·30	·20	·675	·457
" 7	" " 3/8	1·554	5·28	·250	·175	·689	·685	·349	·44	·31	·664	·474
" 6	2 ×2 ×1/4	·947	3·22	·250	·175	·579	·337	·157	·24	·16	·597	·407
" 6	" " 3/8	1·367	4·64	·250	·175	·628	·469	·246	·34	·25	·586	·424
DLT 6A	2 ×1½×1/4	·820	2·79	·225	·150	·408	·148	·159	·14	·16	·425	·441
" 6A	" " 3/8	1·180	4·01	·225	·150	·455	·202	·246	·19	·25	·414	·457
BST 5	1½×2 ×1/4	·820	2·79	·225	·150	·648	·307	·068	·23	·09	·612	·288
" 5	" " 5/16	1·003	3·41	·225	·150	·674	·369	·088	·28	·12	·607	·296
" 4	1¾×1¾×1/4	·820	2·79	·225	·150	·519	·221	·107	·18	·12	·520	·361
" 4	" " 5/16	·999	3·40	·225	·150	·544	·265	·137	·22	·16	·515	·370
" 3	1½×1½×3/16	·531	1·81	·200	·150	·435	·106	·048	·10	·06	·447	·301
" 3	" " 1/4	·692	2·35	·200	·150	·460	·135	·067	·13	·09	·442	·312

The properties of British Standard Sections in above table, where taken from the Engineering Standards Committee's Section Book, are published by permission of the Committee.

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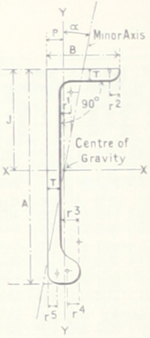
BULB ANGLES.

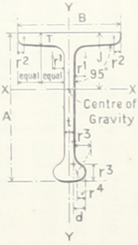
DIMENSIONS AND PROPERTIES.



Reference Mark	Size A × B	Standard Thickness T	Area square inches	Weight per foot—lbs.	Radii r^1	Radii r^2
BSBA 20	12 ×4	·600	10·724	36·46	·675	·450
" 19	11 ×3½	·550	8·953	30·44	·625	·425
" 18	10 ×3½	·525	7·904	26·87	·575	·400
" 17	9½×3½	·500	7·277	24·74	·550	·375
" 16	9 ×3½	·475	6·677	22·70	·550	·350
" 14	8½×3½	·475	6·339	21·55	·525	·350
" 12	8 ×3½	·450	5·779	19·65	·500	·325
" 11	8 ×3	·425	5·301	18·02	·500	·325
" 9	7½×3	·425	5·023	17·08	·475	·325
" 8	7 ×3½	·425	4·940	16·80	·450	·300
" 7	7 ×3	·400	4·498	15·29	·450	·300
" 6	6½×3½	·400	4·420	15·03	·425	·275
" 5	6½×3	·375	4·002	13·61	·425	·275
" 4	6 ×3	·375	3·763	12·79	·400	·275
" 3	5½×3	·350	3·332	11·33	·375	·250

BULB TEES.

DIMENSIONS AND PROPERTIES.



Reference Mark	Size A × B	Standard Thickness t	Standard Thickness T	Area square inches	Weight per foot—lbs.	Radii r^1	Radii r^2
BSBT 6*	12 ×6½	·575	·650	12·498	42·49	·975	·325
" 5*	11 ×6½	·550	·600	11·136	37·86	·900	·300
" 4*	10 ×6	·500	·550	9·295	31·60	·825	·275
" 3*	9 ×5½	·475	·500	7·870	26·76	·750	·250
" 2*	8 ×5½	·450	·450	6·701	22·78	·675	·225
" 1*	7 ×5	·425	·425	5·592	19·01	·600	·200
DLBT 1A	2½×2½	·3125	·3125	1·759	5·98	·26	·14
" 1B	2 ×2	·2	·2	·941	3·20	·2	·1

The properties of British Standard Sections in above tables, where taken from the Engineering Standards Committee's Section Book, are published by permission of the Committee.

BULB ANGLES.

DIMENSIONS AND PROPERTIES.

Radii			Centre of Gravity		Moments of Inertia		Section Moduli		Angle ∝ Degrees	Least Radius of Gyration Inches	Reference Mark
r^3	r^4	r^5	J	P	About XX	About YY	About XX	About YY			
1·125	·675	·550	5·585	·778	191·443	8·355	29·843	2·593	4½	·821	BSBA 20
1·050	·625	·525	5·188	·686	133·856	5·170	23·031	1·837	4	·715	" 19
·975	·575	·500	4·622	·693	98·228	4·828	18·265	1·720	5	·724	" 18
·950	·550	·475	4·361	·694	82·418	4·585	16·038	1·634	5½	·729	" 17
·900	·550	·450	4·095	·695	68·383	4·336	13·941	1·546	6	·735	" 16
·850	·525	·425	3·798	·706	57·725	4·265	12·277	1·525	7	·740	" 14
·825	·500	·400	3·543	·712	47·072	4·031	10·561	1·446	8	·746	" 12
·825	·500	·400	3·698	·600	42·863	2·449	9·964	1·020	5½	·627	" 11
·800	·475	·400	3·419	·612	35·725	2·405	8·754	1·007	6	·632	" 9
·750	·450	·375	2·998	·737	30·914	3·730	7·725	1·350	10	·758	" 8
·750	·450	·375	3·141	·614	28·063	2·250	7·272	·943	7	·638	" 7
·700	·425	·350	2·723	·747	23·943	3·494	6·339	1·269	11½	·764	" 6
·700	·425	·350	2·865	·619	21·677	2·098	5·963	·881	8½	·644	" 5
·675	·400	·325	2·597	·633	17·350	2·057	5·098	·871	10	·648	" 4
·650	·375	·325	2·346	·649	13·032	1·909	4·132	·812	11½	·653	" 3

BULB TEES.

DIMENSIONS AND PROPERTIES.

Radii		Dimension	Centre of Gravity	Moments of Inertia		Section Moduli		Radii of Gyrat'n—Inches		Reference Mark
r^3	r^4	d	J	About XX	About YY	About XX	About YY	About XX	About YY	
1·30	·475	·725	4·759	236·808	13·965	32·704	4·297	4·353	1·057	BSBT 6*
1·20	·450	·675	4·290	177·041	12·690	26·324	3·905	3·983	1·067	" 5*
1·10	·400	·625	3·881	122·278	9·124	19·984	3·041	3·627	·991	" 4*
1·00	·375	·575	3·524	83·730	6·410	15·290	2·331	3·262	·902	" 3*
·90	·325	·500	3·018	55·377	5·628	11·115	2·046	2·875	·916	" 2*
·80	·300	·450	2·611	35·087	4·021	7·994	1·608	2·505	·848	" 1*
·3	·2	·344	·977	1·392	·403	·914	·322	·890	·479	DLBT 1A
·26	·16	·25	·789	·493	·127	·407	·127	·724	·367	" 1B

The properties of British Standard Sections in above tables, where taken from the Engineering Standards Committee's Section Book, are published by permission of the Committee.

NOTES ON I BEAMS AND COMPOUNDS.

Dimensions and Properties.—The dimensions and properties of I beams will be found on pages 34 and 35.

The dimensions and properties of compounds are given on the pages immediately preceding those containing the tabular loads for each type. The moment of inertia and section modulus have been calculated on the net section, that is both flanges holed for rivets, the size allowed in any particular case, being shown in the several tables.

Weight of Compounds.—The published weights per foot of compounds are inclusive of rivets. The pitch of rivets for spans in general demand has been taken as the basis of calculation in all cases.

Tabular Loads.—The loads given in the tables include the weights of the girders themselves, and are based on an extreme fibre stress of 7·5 tons per square inch, being one-fourth of the average breaking stress. They are also calculated on the assumption that the girders receive the usual side support as in building work. For other cases, such as concentrated, eccentric, or live loads, special calculation is necessary.

The resistance of the web to shear or buckling has been taken as the limiting factor in deciding the maximum load for each section. These loads should not be exceeded when sections are used at less spans than those for which such values are given.

Deflection.—Care should be taken in selecting beams and compounds that the deflection is not too great for the purpose for which they are to be employed. The zig-zag lines in the tables indicate the generally accepted limit of span to depth (20 to 1) for girders supporting plastered ceilings at full tabular loads.

Deflection Co-efficient.—*For* I beams and compounds of uniform section throughout their lengths, the deflection, in inches, for tabular loads is found by multiplying the square of the span, in feet, by the co-efficient which is given for each section. If the actual load is less than the tabular load, the deflection will be less in exactly the same proportion.

Selection of I Beams and Compounds.—It will be observed that, in the tables of distributed loads on beams, the relative order of the British Standard Sections has been maintained; but in each compound table the girders are arranged in the order of their carrying capacity.

It will be further noted that, in most cases, several compounds of different depths and widths will meet the requirements as to loading. It should, however, be borne in mind that, where the depth is not restricted, a deeper and frequently a lighter section, carrying even a greater load than that required, may often be found more economical.

The table, in any case, affords a ready means of selection.

Riveting of Compounds.—In the tables of compounds, particulars are given of the diameter of rivets for each section, together with the minimum spans, at, and above, which the various pitches may be used. In cases of shorter spans than those for which loads are given, special calculations are necessary.

I BEAMS.

SAFE LOADS IN TONS UNIFORMLY DISTRIBUTED.

For dimensions and properties of sections see pages 34 and 35.

Size Inches	Weight per foot lbs.	SPANS IN FEET 2	4	6	8	10	12	14	16	18
24×7½	100	..	..	..	..	102	92	79	69	61
20×7½	89	..	..	..	94	83	69	59	52	46
18×7	75	..	..	..	78	64	53	45	40	35
16×6	62	..	..	73	56	45	38	32	28	25
15×6	59	..	..	62	52	42	35	30	26	23
15×5	42	..	..	47	35	28	24	20	18	16
14×6	57	..	..	59	47	38	31	27	24	21
14×6	46	..	..	43	39	31	26	22	19	17
12×6	54	..	53	52	39	31	26	22	19	17
12×6	44	..	..	40	33	26	22	19	16	14
12×5	39	..	45	36	27	22	18	15	13	12
12×5	32	..	32	30	23	18	15	13	11	10
10×8	70	..	..	53	43	34	28	24	21	19
10×6	42	..	..	35	26	21	17	15	13	11
10×5	35	..	37	28	21	17	14	12	10	9·3
10×5	30	..	30	24	18	14	12	10	9	8
9×7	58	..	44	42	32	25	21	18	16	14
*9¼×3¾	21·5	26	22	15	11	9·0	7·5	6·4	5·6	5·0
9×4	21	..	22	15	11	9	7·5	6·4	5·6	5
8×6	35	..	31	23	17	14	11	9·8	8·6	7·7
8×5	28	..	25	18	14	11	9	8	7	6·2
8×4	25	27	23	16	12	9·4	7·8	6·7	5·9	5·2
8×4	18	19	17	11	8·7	7	5·8	5	4·3	3·8
7×4	16	15	14	9·4	7	5·6	4·7	4	3·5	3·1
6×5	25	22	18	12	9	7·3	6	5·2	4·5	4
6×4½	20	20	14	9·6	7·2	5·8	4·8	4·1	3·6	3·2
6×3	16	18	11	7·3	5·4	4·4	3·6	3·1	2·7	2·4
6×3	12	14	8·4	5·6	4·2	3·4	2·8	2·4	2·1	1·9
*5×5	24	..	15	9·8	7·3	5·9	4·9	4·2	3·7	..
5×4½	18	13	11·3	7·6	5·6	4·5	3·8	3·2	2·8	..
5×4 3/16	19	18	11	7·4	5·6	4·5	3·7	3·2	2·8	..
5×3	11	9·8	6·8	4·5	3·4	2·7	2·3	1·9	1·7	..
4¾×1¾	10	..	4·9	3·3	2·4	2·0	1·6	1·4	..	..
4¾×1¾	6·5	7	3·5	2·4	1·8	1·4	1·2	1	..	..
4×3	9·5	7·8	4·7	3·1	2·3	1·9	1·6	1·3	..	..
4×1¾	8	6·6	3·3	2·2	1·6	1·3	1·1	·95	..	..
4×1¾	5	4·6	2·3	1·5	1·1	·91	·76	·65	..	..
*3×3	8·5	5·3	3·2	2	1·6	1·2	1	·9	..	..
3½×1½	6	4·4	2·2	1·5	1·1	·88	·73	·63	..	..
3×1½	4	2·8	1·4	·92	·6	·55	·46	·39	..	..

DORMAN, LONG & CO. LIMITED.

I BEAMS.

SAFE LOADS IN TONS UNIFORMLY DISTRIBUTED.

For dimensions and properties of sections see pages 34 and 35.

SPANS IN FEET									Deflection Coefficient	Weight per foot lbs.	Size Inches
20	22	24	26	28	30	32	36	40			
55	50	46	42	39	36	34	30	27	·00078	100	24 × 7½
41	38	34	32	29	27	26	23	20	·000937	89	20 × 7½
32	29	26	24	22	21	20	17	..	·00104	75	18 × 7
22	20	19	17	16	15	14	12	..	·00117	62	16 × 6
21	19	17	16	15	14	13	11	..	·00125	59	15 × 6
14	13	12	11	10	9·5	9	..	..	·00125	42	15 × 5
19	17	16	14	13	12	..	..	..	·00133	57	14 × 6
15	14	13	12	11	10	..	..	..	·00133	46	14 × 6
15	14	13	12	11	10	..	..	..	·00156	54	12 × 6
13	12	11	10	9	..	..	..	..	·00156	44	12 × 6
11	9·9	9·0	8·3	7·7	7·2	..	..	..	·001562	39	12 × 5
9	8·3	7·6	7	6·5	..	..	..	..	·00156	32	12 × 5
17	15	14	13	..	..	..	..	..	·001875	70	10 × 8
10	9·6	8·8	8	..	..	..	..	..	·001875	42	10 × 6
8·4	7·6	7·0	6·4	..	..	..	..	..	·001875	35	10 × 5
7·2	6·6	6	5·6	..	..	..	..	..	·001875	30	10 × 5
12	11	10	9·8	..	..	..	..	..	·00208	58	9 × 7
4·5	4·1	3·7	3·5	..	..	..	..	..	·002027	21·5	9¼ × 3⅝*
4·5	4	3·7	..	..	..	..	..	..	·00208	21	9 × 4
7	6·3	..	..	..	..	..	..	..	·00234	35	8 × 6
5·5	5	..	..	..	..	..	..	..	·00234	28	8 × 5
4·7	4·2	..	..	..	..	..	..	..	·002344	25	8 × 4
3·5	3·2	..	..	..	..	..	..	..	·00234	18	8 × 4
2·8	2·5	..	..	..	..	..	..	..	·00268	16	7 × 4
..	..	..	..	..	..	..	..	..	·003125	25	6 × 5
..	..	..	..	..	..	..	..	..	·003125	20	6 × 4½
..	..	..	..	..	..	..	..	..	·003125	16	6 × 3
..	..	..	..	..	..	..	..	..	·003125	12	6 × 3
..	..	..	..	..	..	..	..	..	·00375	24	5 × 5*
..	..	..	..	..	..	..	..	..	·00375	18	5 × 4½
..	..	..	..	..	..	..	..	..	·00375	19	5 × 4½
..	..	..	..	..	..	..	..	..	·00375	11	5 × 3
..	..	..	..	..	..	..	..	..	·00395	10	4¾ × 1¾
..	..	..	..	..	..	..	..	..	·00395	6·5	4¾ × 1¾
..	..	..	..	..	..	..	..	..	·00469	9·5	4 × 3
..	..	..	..	..	..	..	..	..	·00469	8	4 × 1¾
..	..	..	..	..	..	..	..	..	·00469	5	4 × 1¾
..	..	..	..	..	..	..	..	..	·00625	8·5	3 × 3*
..	..	..	..	..	..	..	..	..	·005357	6	3½ × 1¾
..	..	..	..	..	..	..	..	..	·00625	4	3 × 1½

DIMENSIONS OF COMPOUND GIRDERS.

For safe distributed loads see following pages.

Reference Mark	COMPOSED OF			Dimensions in inches	
	Beams	Flats		Depth	Width
		No.	Size		
B C 1	24×7½×100	4	12×⅝	26½	12
„ 2	20×7½×89	4	12×⅝	22½	12
„ 3	24×7½×100	2	12×⅝	25¼	12
„ 4	18×7 ×75	4	12×⅝	20½	12
„ 5	18×7 ×75	4	10×⅝	20½	10
„ 6	20×7½×89	2	12×⅝	21¼	12
„ 7	16×6 ×62	4	10×⅝	18½	10
„ 8	15×6 ×59	4	10×⅝	17½	10
„ 9	18×7 ×75	2	12×⅝	19¼	12
„ 10	16×6 ×62	4	10×½	18	10
„ 11	18×7 ×75	2	10×⅝	19¼	10
„ 12	15×6 ×59	4	10×½	17	10
„ 13	14×6 ×57	4	9×⅝	16½	9
„ 14	14×6 ×57	4	9×½	16	9
„ 15	12×6 ×54	4	9×⅝	14½	9
„ 16	16×6 ×62	2	10×⅝	17¼	10
„ 17	16×6 ×62	2	9×⅝	17¼	9
„ 18	12×6 ×54	4	9×½	14	9
„ 19	10×6 ×42	4	9×⅝	12½	9
„ 20	15×5 ×42	2	9×⅝	16¼	9
„ 21	14×6 ×46	2	9×⅝	15¼	9
„ 22	10×6 ×42	4	9×½	12	9
„ 23	15×5 ×42	2	9×½	16	9
„ 24	14×6 ×46	2	9×½	15	9
„ 25	12×6 ×44	2	9×⅝	13¼	9
„ 26	12×6 ×44	2	9×½	13	9
„ 27	10×6 ×42	2	9×⅝	11¼	9
„ 28	10×6 ×42	2	9×½	11	9

DORMAN, LONG & CO. LIMITED.

PROPERTIES OF COMPOUND GIRDERS.

For safe distributed loads see following pages.

PROPERTIES OF SECTION				Diameter of Rivets	Minimum Spans in feet for Pitches (p)			Reference Mark
Area sq. inches	Weight per foot—lbs.	Moment of Inertia	Section Modulus	Inches	3″	4″	6″	
59·40	205	6811	514·0	7/8	24	30	..	B C 1
56·17	195	4632	411·7	7/8	20	30	..	" 2
44·40	153	4495	356·0	7/8	..	16	24	" 3
52·06	181	3592	350·4	7/8	22	30	..	" 4
47·06	163	3128	305·1	7/8	18	26	..	" 5
41·17	142	2976	280·1	7/8	..	14	24	" 6
43·23	151	2326	251·4	7/8	16	26	..	" 7
42·35	148	2049	234·1	7/8	18	26	..	" 8
37·06	129	2225	231·1	7/8	..	14	24	" 9
38·23	133	1948	216·4	7/8	14	20	..	" 10
34·56	119·5	2008	208·6	7/8	..	12	20	" 11
37·35	130	1711	201·2	7/8	16	20	..	" 12
39·26	136·5	1640	198·7	7/8	16	22	..	" 13
34·76	121·5	1373	171·6	7/8	14	20	..	" 14
38·38	133	1234	170·2	3/4	20	30	..	" 15
30·73	107·5	1420	164·6	7/8	..	10	20	" 16
29·48	102·5	1334	154·6	7/8	..	10	18	" 17
33·88	118	1026	146·6	3/4	16	26	..	" 18
34·85	121	838	134·0	3/4	18	24	..	" 19
23·60	82·5	999	123·0	3/4	..	12	22	" 20
24·78	86·5	924	121·1	7/8	..	14	18	" 21
30·35	106	684	114·0	3/4	16	20	..	" 22
21·35	74	866	108·3	3/4	..	10	18	" 23
22·53	78·5	809	107·8	7/8	..	12	14	" 24
24·19	84·5	688	103·8	3/4	..	12	22	" 25
21·94	76·5	600	92·2	3/4	..	10	18	" 26
23·60	82·5	476	84·6	3/4	..	12	22	" 27
21·35	74·5	413	75·0	3/4	..	10	18	" 28

COMPOUND GIRDERS.

SAFE LOAD IN TONS UNIFORMLY DISTRIBUTED.

For dimensions and properties of sections see preceding pages.

Reference Mark	SPANS IN FEET											
	8	10	12	14	16	18	20	22	24	26	28	30
BC 1	..	..	..	..	..	..	..	..	102	99	92	86
" 2	..	..	..	..	..	..	..	94	86	79	74	69
" 3	..	..	..	..	102	99	89	81	74	69	64	59
" 4	..	..	..	..	..	..	..	78	73	67	62	58
" 5	..	..	..	..	..	78	76	69	64	59	55	51
" 6	..	..	..	94	88	78	70	64	58	54	50	47
" 7	..	..	..	..	73	70	63	57	52	48	45	42
" 8	..	..	..	..	..	62	59	53	49	45	42	39
" 9	..	..	..	78	72	64	58	52	48	44	41	38
" 10	..	..	..	73	68	60	54	49	45	42	39	36
" 11	..	..	78	75	65	58	52	47	43	40	37	35
" 12	..	..	..	..	62	56	50	46	42	39	36	33
" 13	..	..	..	..	59	55	50	45	41	38	35	33
" 14	..	..	..	59	54	48	43	39	36	33	31	29
" 15	..	..	..	..	..	..	42	38	35	32	30	28
" 16	..	73	69	59	51	46	41	37	34	31	29	27
" 17	..	73	64	55	48	43	39	35	32	30	28	26
" 18	..	..	..	..	46	41	37	33	30	28	26	..
" 19	..	..	..	..	..	35	34	31	28	26	..	..
" 20	..	..	47	44	38	34	31	28	26	24	22	20
" 21	..	..	..	43	38	34	30	27	25	23	21	20
" 22	..	..	..	..	35	32	29	26	24	..	..	..
" 23	..	47	45	39	34	30	27	25	23	21	19	18
" 24	..	..	43	39	34	30	27	25	23	21	19	18
" 25	..	..	40	37	32	29	26	24	22	20	..	..
" 26	..	40	38	33	29	26	23	21	19	18	..	..
" 27	..	..	35	30	26	23	21	19	18	..	..	..
" 28	..	35	31	27	23	21	19	17	..	..	..	..

COMPOUND GIRDERS.

SAFE LOAD IN TONS UNIFORMLY DISTRIBUTED.

For dimensions and properties of sections see preceding pages.

SPANS IN FEET 32	34	36	38	40	42	44	46	48	50	Deflection Coefficient	Reference Mark
80	75	71	67	64	61	58	55	53	51	·000708	B C 1
64	60	57	54	51	49	47	45	..	..	·000833	,, 2
55	52	49	47	45	43	41	39	37	36	·000742	,, 3
55	52	49	46	44	42	..	..	..	..	·000915	,, 4
48	45	42	40	38	36	..	..	..	..	·000915	,, 5
44	41	39	37	35	33	32	..	..	..	·000882	,, 6
39	37	35	33	..	..	..	..	..	..	·001014	,, 7
36	34	33	..	..	..	..	..	..	..	·001072	,, 8
36	34	32	30	29	..	..	..	..	..	·000974	,, 9
34	32	30	..	..	..	..	..	..	..	·001042	,, 10
33	31	29	27	..	..	..	..	..	..	·000974	,, 11
31	30	..	..	..	..	..	..	..	..	·001103	,, 12
31	29	..	..	..	..	..	..	..	..	·001137	,, 13
27	..	..	..	..	..	..	..	..	..	·001171	,, 14
..	..	..	..	..	..	..	..	..	..	·001293	,, 15
25	24	..	..	..	..	..	..	..	..	·001087	,, 16
24	23	..	..	..	..	..	..	..	..	·001087	,, 17
..	..	..	..	..	..	..	..	..	..	·00134	,, 18
..	..	..	..	..	..	..	..	..	..	·0015	,, 19
19	..	..	..	..	..	..	..	..	..	·001153	,, 20
..	..	..	..	..	..	..	..	..	..	·001229	,, 21
..	..	..	..	..	..	..	..	..	..	·001562	,, 22
17	..	..	..	..	..	..	..	..	..	·001171	,, 23
..	..	..	..	..	..	..	..	..	..	·00125	,, 24
..	..	..	..	..	..	..	..	..	..	·001415	,, 25
..	..	..	..	..	..	..	..	..	..	·001443	,, 26
..	..	..	..	..	..	..	..	..	..	·001666	,, 27
..	..	..	..	..	..	..	..	..	..	·001704	,, 28

DIMENSIONS OF COMPOUND GIRDERS.

For safe distributed loads see following pages.

Reference Mark	COMPOSED OF			Centres of Beams	Dimensions in inches	
	Beams	Plate				
		No.	Size	inches	Depth	Width
B C 29	24 × 7½ × 100	6	18 × ⅝	9	27¾	18
„ 30	24 × 7½ × 100	6	16 × ⅝	8	27¾	16
„ 31	20 × 7½ × 89	6	18 × ⅝	9	23¾	18
„ 32	24 × 7½ × 100	4	18 × ⅝	9	26½	18
„ 33	20 × 7½ × 89	6	16 × ⅝	8	23¾	16
„ 34	24 × 7½ × 100	4	16 × ⅝	8	26½	16
„ 35	18 × 7 × 75	6	18 × ⅝	9	21¾	18
„ 36	20 × 7½ × 89	4	18 × ⅝	9	22½	18
„ 37	20 × 7½ × 89	4	16 × ⅝	8	22½	16
„ 38	24 × 7½ × 100	2	18 × ⅝	9	25¼	18
„ 39	24 × 7½ × 100	2	16 × ⅝	8	25¼	16
„ 40	18 × 7 × 75	4	18 × ⅝	9	20½	18
„ 41	18 × 7 × 75	4	16 × ⅝	8	20½	16
„ 42	20 × 7½ × 89	2	18 × ⅝	9	21¼	18
„ 43	16 × 6 × 62	6	16 × ½	8	19	16
„ 44	20 × 7½ × 89	2	16 × ⅝	8	21¼	16
„ 45	15 × 6 × 59	6	16 × ½	8	18	16
„ 46	16 × 6 × 62	6	14 × ½	7	19	14
„ 47	16 × 6 × 62	4	16 × ⅝	8	18½	16
„ 48	16 × 6 × 62	6	13 × ½	6½	19	13
„ 49	18 × 7 × 75	2	18 × ⅝	9	19¼	18
„ 50	16 × 6 × 62	4	14 × ⅝	7	18½	14
„ 51	18 × 7 × 75	2	16 × ⅝	8	19¼	16
„ 52	16 × 6 × 62	4	14 × ½	7	18	14
„ 53	14 × 6 × 46	4	14 × ⅝	7	16½	14
„ 54	14 × 6 × 46	4	13 × ⅝	6½	16½	13
„ 55	16 × 6 × 62	2	16 × ⅝	8	17¼	16
„ 56	16 × 6 × 62	2	14 × ⅝	7	17¼	14
„ 57	14 × 6 × 46	4	14 × ½	7	16	14
„ 58	16 × 6 × 62	2	13 × ⅝	6½	17¼	13
„ 59	15 × 5 × 42	4	12 × ½	6	17	12
„ 60	15 × 5 × 42	2	14 × ⅝	7	16¼	14
„ 61	14 × 6 × 46	2	14 × ⅝	7	15¼	14
„ 62	12 × 5 × 32	4	13 × ½	6½	14	13
„ 63	14 × 6 × 46	2	13 × ½	6½	15	13
„ 64	15 × 5 × 42	2	12 × ½	6	16	12
„ 65	10 × 5 × 30	4	13 × ½	6½	12	13
„ 66	10 × 5 × 30	4	12 × ½	6	12	12
„ 67	12 × 5 × 32	2	13 × ⅝	6½	13¼	13
„ 68	12 × 5 × 32	2	12 × ½	6	13	12
„ 69	10 × 5 × 30	2	13 × ½	6½	11	13
„ 70	10 × 5 × 30	2	12 × ½	6	11	12

PROPERTIES OF COMPOUND GIRDERS.

For safe distributed loads see following pages.

Properties of Section				Diameter of Rivets	Minimum Space in feet for Pitches (*x*)			Reference Mark
Area sq. inches	Weight per foot – lbs.	Moment of Inertia	Section Modulus	inches	3'	6'	9'	
126·30	435·5	14941	1076·8	⅞	...	26	...	B.G. 29
118·80	410	13884	986·3	⅞	...	24	...	„ 30
119·84	413·5	10297	864·6	⅞	22	28	...	„ 31
108·80	357	11329	847·5	⅞		20	22	„ 32
112·34	388	9397	788·8	⅞	20	26		„ 33
98·80	340	10432	787·3	⅞		18	20	„ 34
111·62	385·5	8045	739·7	⅞	22	28	...	„ 35
97·34	337	7566	672·7	⅞	16	22	22	„ 36
93·34	320	7003	622·4	⅞	16	20	20	„ 37
81·30	280·5	7853	622·0	⅞	...	14	16	„ 38
78·80	272	7473	591·9	⅞		14	16	„ 39
89·12	309	5792	565·0	⅞	16	22	22	„ 40
84·12	292	5327	519·7	⅞	16	20	20	„ 41
74·84	258·5	5153	485·0	⅞		12	16	„ 42
84·46	293·5	4528	476·6	⅞	16	22		„ 43
72·34	250	4888	460·0	⅞		12	16	„ 44
82·70	287	3992	443·6	⅞	16	22	...	„ 45
78·46	273	4068	428·3	⅞	14	20		„ 46
76·46	266	3907	422·3	⅞	14	20	20	„ 47
75·46	265	3637	403·9	⅞	7	10	14	„ 48
66·62	230·5	3798	394·6	⅞		12	16	„ 49
71·46	249·5	3534	382·0	⅞	12	18	24	„ 50
64·12	222	3562	372·1	⅞	...	10	16	„ 51
64·46	227·5	3028	336·4	⅞	8	10	16	„ 52
62·06	217	2537	307·5	⅞		16	24	„ 53
59·56	211	2391	289·8	⅞	9	12	18	„ 54
56·46	196	2494	289·1	⅞		8	16	„ 55
53·96	187·5	2321	269·0	⅞		8	14	„ 56
55·06	191·5	2136	267·0	⅞		14	20	„ 57
52·71	187·5	2234	259·0	⅞	9	12	18	„ 58
48·70	169·5	2079	244·6	¾	12	18	22	„ 59
42·20	148	1694	208·4	¾	...	10	18	„ 60
44·56	155·5	1580	207·2	⅞	...	12	14	„ 61
44·82	157·5	1346	192·3	¾	10	13	19	„ 62
40·06	144·5	1354	180·5	⅞	7	10	14	„ 63
36·70	127·5	1372	171·5	¾	...	8	14	„ 64
43·64	153·5	943	157·1	¾	10	13	19	„ 65
41·64	145·5	882	147·0	¾	12	18	22	„ 66
35·07	124·5	949	143·3	¾	12	16	24	„ 67
30·82	107·5	738	121·2	¾	...	8	14	„ 68
30·64	108	586	102·8	¾	10	13	19	„ 69
29·64	105	538	97·8	¾	...	8	14	„ 70

COMPOUND GIRDERS.

SAFE LOAD IN TONS UNIFORMLY DISTRIBUTED.

For dimensions and properties of sections see preceding pages.

Reference Mark	SPANS IN FEET											
	8	10	12	14	16	18	20	22	24	26	28	30
BC 29	..	..	..	..	..	..	..	..	..	204	192	180
" 30	..	..	..	..	..	..	..	..	204	190	176	164
" 31	..	..	..	..	..	..	..	188	180	166	154	144
" 32	..	..	..	..	..	..	204	193	177	163	151	141
" 33	..	..	..	..	..	..	188	179	164	152	141	131
" 34	..	..	..	..	..	204	197	179	164	151	141	131
" 35	..	..	..	..	..	..	..	156	154	142	132	123
" 36	..	..	..	..	188	187	168	153	140	129	120	112
" 37	..	..	..	..	188	173	156	142	130	120	111	104
" 38	..	..	..	204	194	173	156	142	130	120	111	104
" 39	..	..	..	204	185	164	148	135	123	114	106	99
" 40	..	..	..	..	..	156	141	128	118	109	101	94
" 41	..	..	..	..	156	144	130	118	108	100	93	87
" 42	..	..	188	173	152	135	121	110	101	93	87	81
" 43	..	..	..	..	146	132	119	108	99	92	85	79
" 44	..	..	188	164	144	128	115	105	96	89	82	77
" 45	..	..	..	..	124	123	111	101	92	85	79	74
" 46	..	..	..	146	134	119	107	97	89	82	76	71
" 47	..	..	..	146	132	117	106	96	88	81	75	70
" 48	253	202	168	144	126	112	101	92	84	78	72	67
" 49	..	..	156	141	123	110	99	90	82	76	71	66
" 50	..	..	146	136	119	106	96	87	80	74	68	64
" 51	..	156	155	133	116	103	93	85	78	72	66	62
" 52	210	168	140	120	105	93	84	76	70	65	60	56
" 53	..	..	..	..	86	85	77	70	64	59	55	51
" 54	..	145	121	104	91	81	72	66	60	56	52	48
" 55	146	145	121	103	90	80	72	66	60	55	51	48
" 56	146	135	112	96	84	75	67	61	56	52	48	45
" 57	..	..	..	86	83	74	67	61	56	52	48	45
" 58	..	130	108	93	81	72	65	59	54	50	46	43
" 59	..	..	94	87	76	68	61	56	51	47	44	41
" 60	..	94	87	74	65	58	52	47	43	40	37	35
" 61	..	..	86	74	65	58	52	47	43	40	37	35
" 62	..	96	80	69	60	53	48	44	40	37	34	..
" 63	113	90	75	64	56	50	45	41	38	35	32	30
" 64	94	86	71	61	54	48	43	39	36	33	31	29
" 65	..	79	65	56	49	44	39	36	33	30	..	..
" 66	..	..	60	53	46	41	37	33	31	..	..	..
" 67	..	..	60	51	45	40	36	33	30	28	26	..
" 68	64	61	51	43	38	34	30	27	25	23	..	..
" 69	..	51	43	37	32	29	26	23	..	..	..	..
" 70	60	49	41	35	31	27	24	22	..	..	..	..

DORMAN, LONG & CO. LIMITED.

COMPOUND GIRDERS.

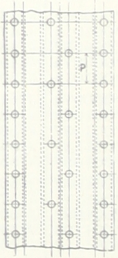
SAFE LOAD IN TONS UNIFORMLY DISTRIBUTED.

For dimensions and properties of sections see preceding pages.

SPANS IN FEET 32	34	36	38	40	42	44	46	48	50	Deflection Coefficient	Reference Mark
168	158	150	142	135	128	122	117	112	108	·000676	B C 29
154	145	137	130	123	117	112	107	103	99	·000676	" 30
135	127	120	114	108	103	98	94	90	..	·00079	" 31
132	125	118	112	106	101	96	92	88	85	·000708	" 32
123	116	109	103	98	94	90	86	82	..	·00079	" 33
123	116	109	103	98	94	90	86	82	79	·000708	" 34
115	108	102	97	92	88	84	..	..	..	·000862	" 35
105	99	93	88	84	80	76	73	..	..	·000834	" 36
97	91	86	82	78	74	71	68	..	..	·000834	" 37
97	91	86	82	78	74	71	68	65	62	·000742	" 38
93	87	82	78	74	70	67	64	61	59	·000742	" 39
88	83	78	74	70	67	..	..	..	..	·000915	" 40
81	76	72	68	65	62	..	..	..	..	·000915	" 41
76	71	67	64	61	58	..	..	..	..	·000882	" 42
74	70	66	63	..	..	..	..	..	..	·000987	" 43
72	68	64	60	57	55	..	..	..	..	·000882	" 44
69	65	62	..	..	..	..	..	..	..	·001042	" 45
67	63	59	56	..	..	..	..	..	..	·000987	" 46
66	62	59	56	..	..	..	..	..	..	·001014	" 47
63	59	56	..	..	..	..	..	..	..	·000987	" 48
62	58	55	52	..	..	..	..	..	..	·000974	" 49
60	56	53	50	..	..	..	..	..	..	·001014	" 50
58	55	52	49	..	..	..	..	..	..	·000974	" 51
53	49	47	..	..	..	..	..	..	..	·001042	" 52
48	45	..	..	..	..	..	..	..	..	·001137	" 53
45	..	..	..	..	..	..	..	..	..	·001137	" 54
45	43	..	..	..	..	..	..	..	..	·001087	" 55
42	40	..	..	..	..	..	..	..	..	·001087	" 56
42	..	..	..	..	..	..	..	..	..	·001171	" 57
40	38	..	..	..	..	..	..	..	..	·001087	" 58
38	36	..	..	..	..	..	..	..	..	·001103	" 59
33	..	..	..	..	..	..	..	..	..	·001153	" 60
..	..	..	..	..	..	..	..	..	..	·001229	" 61
..	..	..	..	..	..	..	..	..	..	·00134	" 62
..	..	..	..	..	..	..	..	..	..	·00125	" 63
27	..	..	..	..	..	..	..	..	..	·001171	" 64
..	..	..	..	..	..	..	..	..	..	·001562	" 65
..	..	..	..	..	..	..	..	..	..	·001562	" 66
..	..	..	..	..	..	..	..	..	..	·001415	" 67
..	..	..	..	..	..	..	..	..	..	·001442	" 68
..	..	..	..	..	..	..	..	..	..	·001704	" 69
..	..	..	..	..	..	..	..	..	..	·001704	" 70

DIMENSIONS OF COMPOUND GIRDERS.

For safe distributed loads see following pages.



Reference Mark	Composed of: Beams	Flats: No.	Flats: Size	Centres of Beams inches	Dimensions in inches: Depth	Dimensions in inches: Width
BC 71	24×7½×100	6	24×⅝	7⅞	27¾	24
" 72	24×7½×100	6	24×½	7⅞	27	24
" 73	20×7½×89	6	24×⅝	7⅞	23¾	24
" 74	24×7½×100	4	24×⅝	7⅞	26½	24
" 75	24×7½×100	4	24×½	7⅞	26	24
" 76	20×7½×89	6	24×½	7⅞	23	24
" 77	18×7 ×75	6	24×⅝	7⅞	21¾	24
" 78	24×7½×100	2	24×¾	7⅞	25½	24
" 79	20×7½×89	4	24×⅝	7⅞	22½	24
" 80	24×7½×100	2	24×⅝	7⅞	25¼	24
" 81	18×7 ×75	6	24×½	7⅞	21	24
" 82	20×7½×89	4	24×½	7⅞	22	24
" 83	18×7 ×75	4	24×⅝	7⅞	20½	24
" 84	20×7½×89	2	24×¾	7⅞	21½	24
" 85	16×6 ×62	6	20×⅝	6½	19¾	20
" 86	18×7 ×75	4	24×½	7⅞	20	24
" 87	20×7½×89	2	24×⅝	7⅞	21¼	24
" 88	16×6 ×62	6	20×½	6½	19	20
" 89	18×7 ×75	2	24×¾	7⅞	19½	24
" 90	18×7 ×75	2	24×⅝	7⅞	19¼	24
" 91	16×6 ×62	4	20×⅝	6½	18½	20
" 92	16×6 ×62	4	20×½	6½	18	20
" 93	14×6 ×46	4	20×⅝	6½	16½	20
" 94	15×5 ×42	4	18×⅝	6	17½	18
" 95	16×6 ×62	2	20×⅝	6½	17¼	20
" 96	14×6 ×46	4	20×½	6½	16	20
" 97	15×5 ×42	4	18×½	6	17	18
" 98	16×6 ×62	2	20×½	6½	17	20
" 99	14×6 ×46	2	20×⅝	6½	15¼	20
" 100	15×5 ×42	2	18×⅝	6	16¼	18
" 101	14×6 ×46	2	20×½	6½	15	20
" 102	15×5 ×42	2	18×½	6	16	18

PROPERTIES OF COMPOUND GIRDERS.

For safe distributed loads see following pages.

PROPERTIES OF SECTION				Diameter of Rivets	Minimum Spans in feet for Pitches (P)			Reference Mark
Area sq. inches	Weight per foot—lbs.	Moment of Inertia	Section Modulus	inches	3″	4″	6″	
178·20	615·5	20526	1479·3	⅞	24	28	..	B C 71
160·20	554	17545	1299·6	⅞	..	20	..	" 72
168·51	582·5	14051	1183·2	⅞	20	28	..	" 73
148·20	510·5	15647	1180·9	⅞	..	18	28	" 74
136·20	469·5	13821	1063·1	⅞	..	16	22	" 75
150·51	521	11877	1032·7	⅞	18	22	..	" 76
156·18	540·5	10953	1007·1	⅞	20	28	..	" 77
124·20	428·5	12063	946·1	⅞	..	14	16	" 78
138·51	480·5	10504	933·7	⅞	16	18	28	" 79
118·20	408·5	11210	887·9	⅞	..	14	16	" 80
138·18	479	9133	869·8	⅞	18	22	..	" 81
126·51	436·5	9191	835·6	⅞	..	14	22	" 82
126·18	438·5	7991	779·6	⅞	..	16	28	" 83
114·51	395·5	7937	738·3	⅞	..	12	18	" 84
129·69	450·5	7085	717·4	⅞	16	22	..	" 85
114·18	394·5	6903	690·3	⅞	..	14	22	" 86
108·51	375·5	7332	690	⅞	..	12	14	" 87
114·69	399·5	5872	618	⅞	14	20	..	" 88
102·18	353·5	5870	602	⅞	..	12	18	" 89
96·18	333·5	5372	558·1	⅞	..	10	16	" 90
104·69	365·5	5115	552·9	⅞	12	16	22	" 91
94·69	328·5	4398	488·6	⅞	10	14	18	" 92
90·59	314·5	3660	443·6	⅞	..	16	22	" 93
82·05	285	3698	422·7	¾	14	20	28	" 94
79·69	277·5	3395	393·6	⅞	..	8	14	" 95
80·59	280·5	3091	386·4	⅞	..	14	18	" 96
73·05	254·5	3119	366·9	¾	12	16	22	" 97
74·69	260·5	3080	362·3	⅞	..	8	12	" 98
65·59	229·5	2303	302	⅞	..	10	14	" 99
59·55	206·5	2311	284·4	¾	..	10	16	" 100
60·59	212·5	2057	274·3	⅞	..	10	12	" 101
55·05	191	2058	257·2	¾	..	8	14	" 102

COMPOUND GIRDERS.

SAFE LOAD IN TONS UNIFORMLY DISTRIBUTED.

For dimensions and properties of sections see preceding pages.

Reference Mark	SPANS IN FEET											
	8	10	12	14	16	18	20	22	24	26	28	30
BC 71	..	..	..	..	..	..	..	..	306	285	264	247
" 72	..	..	..	..	..	..	306	295	271	250	232	217
" 73	..	..	..	..	..	..	282	269	247	228	211	197
" 74	..	..	..	..	..	306	295	268	246	227	211	197
" 75	..	..	..	..	306	295	266	242	222	205	190	177
" 76	..	..	..	..	..	282	258	235	215	199	184	172
" 77	..	..	..	..	..	..	234	229	210	194	180	168
" 78	..	..	..	306	296	263	237	215	197	182	169	158
" 79	..	..	..	..	282	259	233	212	195	180	167	156
" 80	..	..	..	306	277	247	222	202	185	171	159	148
" 81	..	..	..	..	..	234	218	198	181	167	155	145
" 82	..	..	..	282	261	232	209	190	174	161	149	139
" 83	..	..	..	..	234	217	195	177	162	150	139	130
" 84	..	..	282	264	231	205	185	168	154	142	132	123
" 85	..	..	..	..	219	199	179	163	150	138	128	120
" 86	..	..	..	234	216	192	173	157	144	133	123	115
" 87	..	..	282	246	216	192	173	157	144	133	123	115
" 88	..	..	..	219	193	172	155	141	129	119	110	103
" 89	..	..	234	215	188	167	151	137	125	116	108	100
" 90	..	234	233	199	174	156	140	127	116	107	100	93
" 91	..	..	219	197	173	154	138	126	115	106	99	92
" 92	..	219	204	175	153	136	122	111	102	94	87	81
" 93	..	..	..	..	129	123	111	101	92	85	79	74
" 94	..	..	..	141	132	117	106	96	88	81	75	70
" 95	219	197	164	141	123	109	98	90	82	76	70	66
" 96	..	..	..	129	121	107	97	88	81	74	69	64
" 97	..	..	141	131	115	102	92	83	76	71	66	61
" 98	219	181	151	129	113	101	91	82	75	70	65	61
" 99	..	129	126	108	94	84	75	69	63	58	54	50
" 100	..	141	119	102	89	79	71	65	59	55	51	47
" 101	..	129	114	98	86	76	69	62	57	53	49	46
" 102	141	128	107	92	80	71	64	59	54	50	46	43

COMPOUND GIRDERS.

SAFE LOAD IN TONS UNIFORMLY DISTRIBUTED.

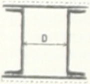
For dimensions and properties of sections see preceding pages.

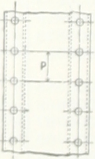
SPANS IN FEET 32	34	36	38	40	42	44	46	48	50	Deflection Coefficient	Reference Mark
231	218	206	195	185	176	168	161	154	148	·000676	BC 71
203	191	181	171	162	155	148	141	135	130	·000695	" 72
185	174	164	155	148	141	134	128	123	..	·00079	" 73
185	174	164	155	148	141	134	128	123	118	·000708	" 74
166	156	148	140	133	127	121	116	111	106	·000722	" 75
161	152	143	136	129	123	117	112	..	..	·000816	" 76
157	148	140	133	126	120	114	..	..	..	·000862	" 77
148	139	131	124	118	113	108	103	99	95	·000736	" 78
146	137	130	123	117	111	106	102	..	..	·000834	" 79
139	131	123	117	111	106	101	97	93	89	·000742	" 80
136	128	121	114	109	104	..	..	..	..	·000893	" 81
131	123	116	110	105	100	95	..	..	..	·000853	" 82
122	115	108	103	98	93	..	..	..	..	·000915	" 83
115	109	103	97	92	88	84	..	..	..	·000873	" 84
112	106	100	94	90	..	..	..	..	..	·00095	" 85
108	102	96	91	86	..	..	..	..	..	·000938	" 86
108	102	96	91	86	82	..	..	..	..	·000882	" 87
97	91	86	81	..	..	..	..	..	..	·000987	" 88
94	89	84	79	75	..	..	..	..	..	·000962	" 89
87	82	77	73	..	..	..	..	..	..	·000974	" 90
86	81	77	73	..	..	..	..	..	..	·001014	" 91
76	72	68	..	..	..	..	..	..	..	·001042	" 92
69	65	..	..	..	..	..	..	..	..	·001137	" 93
66	62	59	..	..	..	..	..	..	..	·001072	" 94
62	58	..	..	..	..	..	..	..	..	·001087	" 95
60	..	..	..	..	..	..	..	..	..	·001171	" 96
57	54	..	..	..	..	..	..	..	..	·001103	" 97
57	53	..	..	..	..	..	..	..	..	·001103	" 98
..	..	..	..	..	..	..	..	..	..	·001229	" 99
44	..	..	..	..	..	..	..	..	..	·001153	" 100
..	..	..	..	..	..	..	..	..	..	·00125	" 101
40	..	..	..	..	..	..	..	..	..	·001171	" 102

DORMAN, LONG & CO. LIMITED.

DIMENSIONS OF COMPOUND GIRDERS.

For safe distributed loads see following pages.





Reference Mark	Composed of: Channels	Flats: No.	Flats: Size	Dimension D inches	Dimensions in inches: Depth	Dimensions in inches: Width
CC 103	15×4 ×41·94	4	14×⅝	5½	17½	14
" 104	15×4 ×41·94	4	14×½	5½	17	14
" 105	12×3½×26·1	4	14×⅝	6½	14½	14
" 106	15×4 ×41·94	2	14×⅝	5½	16¼	14
" 107	12×3½×26·1	4	14×½	6½	14	14
" 108	15×4 ×41·94	2	14×½	5½	16	14
" 109	10×3½×23·55	4	14×½	6½	12	14
" 110	10×3½×23·55	4	12×½	4½	12	12
" 111	12×3½×26·1	2	14×⅝	6½	13¼	14
" 112	9×3 ×19·37	4	12×½	5½	11	12
" 113	10×3½×23·55	2	14×⅝	6½	11¼	14
" 114	12×3½×26·1	2	12×½	4½	13	12
" 115	9×3 ×19·37	4	10×½	3½	11	10
" 116	10×3½×23·55	2	12×½	4½	11	12
" 117	9×3 ×19·37	2	12×⅝	5½	10¼	12
" 118	9×3 ×19·37	2	10×½	3½	10	10

DORMAN, LONG & CO. LIMITED.

PROPERTIES OF COMPOUND GIRDERS.

For safe distributed loads see following pages.

PROPERTIES OF SECTION				Diameter of Rivets	Minimum Spans in feet for Pitches (p)			Reference Mark
Area sq. inches	Weight per foot—lbs.	Moment of Inertia	Section Modulus	inches	3"	4"	6"	
59·67	209·	2639	301·6	¾	10	18	24	GG 103
52·67	185·5	2188	257·3	¾	10	16	20	„ 104
50·35	176·5	1627	224·4	¾	14	22	...	„ 105
42·17	147·5	1558	191·7	¾	...	8	14	„ 106
43·35	152·5	1312	187·4	¾	12	20	...	„ 107
38·66	135·5	1361	170·1	¾	...	8	12	„ 108
41·85	147·5	920	153·3	¾	12	20	...	„ 109
37·85	134·	799	133·1	¾	10	18	...	„ 110
32·85	115·5	881	132·9	¾	8	12	18	„ 111
35·39	125·5	626	113·8	¾	8	18	...	„ 112
31·35	110·5	606	107·7	¾	8	12	18	„ 113
27·35	95·5	669	102·9	¾	...	8	14	„ 114
31·39	110·5	525	95·4	¾	8	14	...	„ 115
25·85	92·	455	82·7	¾	...	8	14	„ 116
26·39	93·5	405	79·1	¾	8	12	16	„ 117
21·39	75·5	294	58·8	¾	...	8	12	„ 118

COMPOUND GIRDERS.

SAFE LOAD IN TONS UNIFORMLY DISTRIBUTED.

For dimensions and properties of sections see preceding pages.

Reference Mark	SPANS IN FEET 8	10	12	14	16	18	20	22	24	26	28	30
CC 103	..	129	126	108	94	84	75	68	63	58	54	50
" 104	..	129	107	92	80	71	64	58	53	49	46	43
" 105	..	..	..	72	70	62	56	51	47	43	40	..
" 106	120	96	80	68	60	53	48	44	40	37	34	32
" 107	..	..	71	67	59	52	47	43	39	36	33	..
" 108	106	85	71	61	53	47	43	39	36	33	30	28
" 109	..	..	63	55	48	43	38	35	32	..	..	..
" 110	..	63	55	47	42	37	33	30	28	..	..	..
" 111	71	66	55	47	42	37	33	30	28	26	..	..
" 112	59	56	47	41	36	32	28	26	..	..	..	..
" 113	63	54	45	39	34	30	27	24	..	..	..	..
" 114	64	51	43	37	32	29	26	23	21	20	..	..
" 115	59	48	40	34	30	27	24	22	..	..	..	..
" 116	52	41	35	30	26	23	21	19	..	..	..	..
" 117	49	40	33	28	25	22	20	..	..	..	..	..
" 118	36	29	25	21	18	16	14	..	..	..	..	..

DORMAN, LONG & CO. LIMITED.

COMPOUND GIRDERS.

SAFE LOAD IN TONS UNIFORMLY DISTRIBUTED.

For dimensions and properties of sections see preceding pages.

SPANS IN FEET										Deflection Coefficient	Reference Mark
32	34	36	38	40	42	44	46	48	50		
47	44	..	..	..	..	..	..	..	..	·001071	CC 103
40	38	..	..	..	..	..	..	..	..	·001103	" 104
..	..	..	..	..	..	..	..	..	..	·001293	" 105
30	..	..	..	..	..	..	..	..	..	·001154	" 106
..	..	..	..	..	..	..	..	..	..	·001339	" 107
26	..	..	..	..	..	..	..	..	..	·001172	" 108
..	..	..	..	..	..	..	..	..	..	·001563	" 109
..	..	..	..	..	..	..	..	..	..	·001563	" 110
..	..	..	..	..	..	..	..	..	..	·001415	" 111
..	..	..	..	..	..	..	..	..	..	·001705	" 112
..	..	..	..	..	..	..	..	..	..	·001666	" 113
..	..	..	..	..	..	..	..	..	..	·001442	" 114
..	..	..	..	..	..	..	..	..	..	·001705	" 115
..	..	..	..	..	..	..	..	..	..	·001705	" 116
..	..	..	..	..	..	..	..	..	..	·001829	" 117
..	..	..	..	..	..	..	..	..	..	·001875	" 118

STANCHIONS AND STRUTS.

Crippling Loads for various values of $\frac{l}{r}$.—A table shewing the crippling loads, in tons per square inch, on stanchions and struts, for various values of $\frac{l}{r}$ up to 200, is given on page 69.

Tabular Loads.—The safe loads given in the tables are based on the crippling values above referred to, for the least radius of gyration for each section; the factor of safety adopted being 4. They are for stanchions or struts the ends of which may be considered fixed, and only apply to static and concentric loading.

In preparing the table of safe loads on latticed channel stanchions, it has been assumed that the channels are efficiently connected together by lattice bars, or batten plates, so that they act as a unit, thus eliminating all possibility of failure by local flexure of either channel.

Effective length.—In stanchions or struts having intermediate steelwork connections, so arranged as to prevent side flexure where these connections occur, the effect is such that the load transmitted may be considered as acting on the shortened length, and the section determined accordingly.

Limiting lengths for Tabular Loads.—The maximum lengths for which loads are given are based on the lesser of the two values:—

I.—160 times the least radius of gyration.

II.—40 times the least width of the section.

Selection of Stanchions.—It will be observed that, in each stanchion table, the sections are arranged in order of their carrying capacity, thus affording a ready means of selection according to requirements.

Tabular Weights of Stanchions.—The weight given in the table, for each section, is for the shaft, inclusive of rivets; the pitch of rivets for lengths, in general demand, being taken as the basis for calculation in all cases.

The weights of base, cap and fittings are not included, as they depend on the loads and nature of structure.

Properties of Sections.—The radii of gyration and area are given for each section, from which the maximum or minimum moment of inertia may be found, by multiplying the square of the corresponding radius of gyration by the area. These values will be of service when calculating additional stresses due to wind-pressure, eccentric loading, or other forces producing bending.

Condition of Ends.—Under some conditions it is necessary to consider either one or both ends rounded.

In the case of one end fixed, and the other rounded, the allowable load is found by referring in the table to a length of $1\frac{1}{3}$ times the actual length; whilst with both ends rounded the reference length should be $1\frac{2}{3}$ times the actual length.

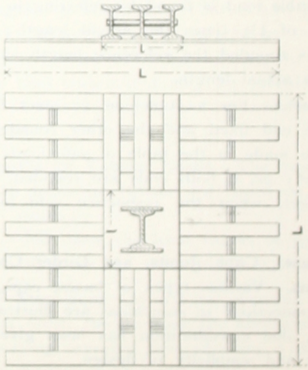
EXAMPLE.—For a stanchion or strut 9 feet long, with one end fixed and the other rounded, reference should be made in the table of safe loads to a length of 12 feet; or, if both ends are rounded, to a length of 15 feet, when the respective safe loads will be found.

Types of Bases, Caps, Joints, and Girder Connections to Stanchions.—Various types of bases, caps, joints, and girder connections to stanchions are illustrated. In all of these, due consideration has been given to ensure efficiency and simplicity of design.

Beam Grillages for Stanchions.—For stanchions carrying heavy loads, the necessity for deep excavations and large masses of masonry in foundations, may be considerably reduced by the adoption of suitable grillages, combined with stanchion bases, carefully designed to transmit the load.

These are generally obtained by placing on a layer of concrete, one, two, or three tiers of I beams, according to the load to be distributed, and the bearing capacity of the ground. The beams in each tier should be kept sufficiently far apart to allow of the space being thoroughly filled with concrete. Cast iron separators, with through bolts, are generally employed to effect this. In cases where two or three tiers are found necessary, they should be efficiently secured to each other, and the stanchion base to the whole.

The following diagram illustrates a grillage, consisting of two tiers of beams:—



The overall dimensions of the lowest tier are determined by the bearing capacity of the ground, and to find the section of beams required in any tier:—

Let W = total load in tons supported by the stanchion.

n = number of beams forming the tier.

w = load in tons supported by one beam = $\frac{W}{n}$.

L = length in feet of each beam.

l = length in feet, at central portion of beam, on which the load above it is distributed.

M = maximum bending moment in foot tons, in one beam (this occurs at the centre of length L).

then $M = \left(\frac{w}{2} \times \frac{L}{4}\right) - \left(\frac{w}{2} \times \frac{l}{4}\right) = \frac{w}{8}(L - l)$.

The above bending moment is equivalent to that produced in a beam supported at both ends, and carrying a distributed load "w" over a span = L − l. Therefore, on reference to this span in the tables of safe loads, given on pages 46 and 47, the size of beam to carry the load w may be obtained direct.

It should be observed, however, that for reasons given on page 44, under the heading "tabular load," the load w should not exceed the maximum load, given in the table, for the section determined upon.

Example.—A grillage has to be provided for a stanchion, on ground having a bearing capacity of 2 tons per square foot, the total load to be supported being 100 tons; assumed size of stanchion base, 2 feet square.

For above load and bearing capacity of ground, two tiers will suffice, and as the area required for the foundation is 50 square feet, the lower tier

will require to be about 7 feet square; therefore, in this tier, nine beams can be placed side by side at 10 inches centres, the load W on each being about $\frac{100}{9}$ or $11\frac{1}{9}$ tons.

The bending moment produced in each beam is equivalent to this load uniformly distributed over a span of $L - l = 7 - 2 = 5$ feet, and referring to table of safe loads on page 46, it is found that B.S.B. 11, $7 \times 4 \times 16$ lbs. per foot, is a suitable section for the lower tier.

The upper tier will be 2 feet wide, i.e., the width of the stanchion base. In this width three beams can be placed side by side at 9 inches centres, the load W on each being about $\frac{100}{3} = 33\frac{1}{3}$ tons, which is equivalent to this load uniformly distributed over a span of $L - l = 7 - 2 = 5$ feet, and on reference to the table of safe loads as before, it will be found that D.L.B. 17.a, $10 \times 5 \times 35$ lbs. per foot, is a suitable section for this tier.

The above analysis involves the usual fundamental assumptions pertaining to flexure.

The exact conditions involved in these assumptions are not usually obtained in grillage practice, so that results obtained by the above analysis should be carefully interpreted.

Our own practice in designing grillages is on the lines of the above analysis.

Where the loads transmitted are very large, the grillage requires special designing, and in such cases, particular attention should be given to the section of the girders with reference to their ability to carry the loads involved without crippling of the webs.

TABLE OF CRIPPLING LOADS

IN TONS PER SQUARE INCH.

For Stanchions or Struts with fixed ends, and various values of $\frac{l}{r}$, in which l = length in inches, and r = radius of gyration in inches.*

$\frac{l}{r}$	Crippling Load	$\frac{l}{r}$	Crippling Load	$\frac{l}{r}$	Crippling Load	$\frac{l}{r}$	Crippling Load	$\frac{l}{r}$	Crippling Load
5	23·97	45	22·45	85	18·92	125	13·99	165	9·93
6	23·96	46	22·39	86	18·81	126	13·87	166	9·85
7	23·95	47	22·33	87	18·70	127	13·75	167	9·77
8	23·94	48	22·26	88	18·59	128	13·63	168	9·69
9	23·92	49	22·19	89	18·48	129	13·51	169	9·61
10	23·90	50	22·12	90	18·37	130	13·40	170	9·53
11	23·88	51	22·05	91	18·26	131	13·29	171	9·45
12	23·86	52	21·98	92	18·15	132	13·18	172	9·37
13	23·84	53	21·91	93	18·03	133	13·07	173	9·29
14	23·82	54	21·83	94	17·91	134	12·96	174	9·21
15	23·80	55	21·75	95	17·79	135	12·85	175	9·13
16	23·77	56	21·67	96	17·67	136	12·74	176	9·05
17	23·74	57	21·59	97	17·55	137	12·63	177	8·98
18	23·71	58	21·51	98	17·43	138	12·52	178	8·91
19	23·68	59	21·43	99	17·31	139	12·41	179	8·84
20	23·65	60	21·35	100	17·19	140	12·30	180	8·77
21	23·62	61	21·26	101	17·06	141	12·19	181	8·70
22	23·59	62	21·17	102	16·93	142	12·09	182	8·63
23	23·56	63	21·08	103	16·80	143	11·99	183	8·56
24	23·52	64	20·99	104	16·67	144	11·89	184	8·49
25	23·48	65	20·90	105	16·53	145	11·79	185	8·42
26	23·44	66	20·81	106	16·40	146	11·69	186	8·35
27	23·40	67	20·72	107	16·27	147	11·59	187	8·28
28	23·36	68	20·63	108	16·14	148	11·49	188	8·21
29	23·32	69	20·54	109	16·01	149	11·39	189	8·14
30	23·28	70	20·44	110	15·88	150	11·29	190	8·07
31	23·23	71	20·34	111	15·75	151	11·19	191	8·00
32	23·18	72	20·24	112	15·62	152	11·09	192	7·93
33	23·13	73	20·14	113	15·49	153	11·00	193	7·87
34	23·08	74	20·04	114	15·36	154	10·91	194	7·81
35	23·03	75	19·94	115	15·23	155	10·82	195	7·75
36	22·98	76	19·84	116	15·10	156	10·73	196	7·69
37	22·93	77	19·74	117	14·97	157	10·64	197	7·63
38	22·87	78	19·64	118	14·84	158	10·55	198	7·57
39	22·81	79	19·54	119	14·71	159	10·46	199	7·51
40	22·75	80	19·44	120	14·59	160	10·37	200	7·45
41	22·69	81	19·34	121	14·47	161	10·28		
42	22·63	82	19·24	122	14·35	162	10·19		
43	22·57	83	19·14	123	14·23	163	10·10		
44	22·51	84	19·03	124	14·11	164	10·01		

*The Crippling Loads for other conditions of ends will be sufficiently accurate if found as follows:—

For one end fixed and the other rounded.—Multiply the actual $\frac{l}{r}$ by 1⅓, and the required Crippling Load will be that given in the table for this value.

For both ends rounded.—Multiply the actual $\frac{l}{r}$ by 1⅔, and the required Crippling Load will be that given in the table for this value.

I BEAMS AS STANCHIONS.

DIMENSIONS AND PROPERTIES.

Reference Mark	Size inches	Area sq. inches	Weight per foot lbs.	Radii of Gyration in inches About XX	Radii of Gyration in inches About YY
IS 1	24×7½	29·40	100	9·50	1·50
" 2	20×7½	26·17	89	7·99	1·54
" 3	10×8	20·6	70	4·09	1·86
" 4	18×7	22·06	75	7·21	1·46
" 5	9×7	17·06	58	3·66	1·64
" 6	16×6	18·23	62	6·31	1·21
" 7	15×6	17·35	59	6·02	1·27
" 8	14×6	16·76	57	5·63	1·29
" 9	12×6	15·88	54	4·86	1·33
" 10	14×6	13·53	46	5·70	1·26
" 11	12×6	12·94	44	4·93	1·31
" 12	10×6	12·35	42	4·13	1·36
" 13	8×6	10·29	35	3·27	1·32
" 14	15×5	12·35	42	5·88	·978
" 15	12×5	11·47	39	4·77	1·03
" 16	10×5	10·29	35	4·03	1·07
" 17	12×5	9·41	32	4·83	1·01
" 18	10×5	8·82	30	4·06	1·05
" 19	8×5	8·24	28	3·29	1·11
" 20	6×5	7·35	25	2·43	1·11
" 21	6×4½	5·88	20	2·42	·959
" 22	5×4½	5·29	18	2·07	1·03
" 23	9×4	6·176	21	3·62	·824
" 24	8×4	5·294	18	3·24	·822
" 25	7×4	4·706	16	2·88	·851

I BEAMS AS STANCHIONS.

SAFE LOADS IN TONS.

ENDS FIXED.

For other conditions of ends see page 60.

SAFE LOADS IN TONS FOR LENGTHS IN FEET										Reference Mark
6	8	10	12	14	16	18	20	22	24	
164	154	143	130	115	100	87	78	..	..	18 1
146	138	129	118	105	92	80	70	..	..	„ 2
118	113	108	101	94	86	78	70	62	56	„ 3
122	115	106	96	84	73	63	..	..	..	„ 4
96	92	86	79	72	64	56	50	..	..	„ 5
98	89	79	67	57	48	..	..	..	..	„ 6
94	86	77	67	57	48	..	..	..	..	„ 7
91	84	76	66	56	48	..	..	..	..	„ 8
87	80	73	64	55	47	..	..	..	..	„ 9
73	67	60	52	44	37	..	..	..	..	„ 10
70	65	59	51	44	38	..	..	..	..	„ 11
68	63	57	51	44	38	32	..	..	..	„ 12
56	52	47	41	35	30	..	..	..	..	„ 13
62	54	44	36	..	..	..	..	..	..	„ 14
59	52	43	35	..	..	..	..	..	..	„ 15
53	47	40	33	27	..	..	..	..	..	„ 16
48	42	35	28	..	..	..	..	..	..	„ 17
45	40	34	28	23	..	..	..	..	..	„ 18
43	39	33	28	23	..	..	..	..	..	„ 19
38	34	30	25	20	..	..	..	..	..	„ 20
29	25	21	17	..	..	..	..	..	..	„ 21
27	24	20	16	..	..	..	..	..	..	„ 22
29	23	18	..	..	..	..	..	..	..	„ 23
25	20	15	..	..	..	..	..	..	..	„ 24
22	18	14	..	..	..	..	..	..	..	„ 25

DORMAN, LONG & CO. LIMITED.

COMPOUND STANCHIONS.

DIMENSIONS AND PROPERTIES.

	COMPOSED OF					
	Beam	Plate				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

COMPOUND STANCHIONS.

SAFE LOADS IN TONS.

ENDS FIXED.

For other conditions of ends see page 65.

SAFE LOADS IN TONS FOR LENGTHS IN FEET														Reference Mark
8	10	12	14	16	18	20	22	24	26	28	30	32	34	
252	245	236	225	214	202	188	173	159	145	133	122	..	..	IS 26
234	228	220	211	201	190	178	165	151	139	128	118	108	..	" 27
211	206	199	191	182	173	162	151	139	128	118	109	100	..	" 28
190	185	179	172	164	156	147	137	126	116	107	99	91	..	" 29
185	181	175	168	161	153	144	135	125	115	106	98	90	..	" 30
182	177	172	165	158	151	142	133	123	114	105	97	90	83	" 31
177	173	168	162	155	148	140	131	122	113	104	96	89	82	" 32
187	182	175	167	158	148	138	126	116	106	97	88	..	..	" 33
172	167	161	154	146	138	129	119	109	100	92	84	..	..	" 34
164	160	156	150	144	138	131	123	115	107	99	91	84	78	" 35
161	157	153	148	142	136	129	122	114	106	98	91	84	78	" 36
167	163	157	150	143	135	127	117	108	99	91	84	77	..	" 37
157	154	150	145	139	133	127	120	112	104	97	90	83	77	" 38
164	160	154	148	141	133	125	116	107	99	91	83	77	..	" 39
167	162	155	148	140	131	121	111	101	92	84	77	..	..	" 40
159	155	150	144	138	131	123	114	105	97	90	83	76	..	" 41
158	152	145	137	128	118	107	97	88	79	..	..	..	..	" 42
146	142	138	133	127	121	114	107	99	91	84	78	72	..	" 43
143	139	135	130	125	119	112	105	98	90	83	77	71	66	" 44
140	136	132	128	123	117	111	104	97	90	83	77	71	66	" 45
135	131	125	119	112	104	96	87	80	73	66	..	..	..	" 46
121	116	110	104	98	90	82	74	67	61	..	..	..	..	" 47
120	115	109	103	96	88	79	72	65	59	..	..	..	..	" 48
109	106	101	96	90	84	77	70	64	58	53	..	..	..	" 49
109	105	100	95	89	82	75	68	62	56	51	..	..	..	" 50
108	103	98	92	86	78	71	64	58	52	..	..	..	..	" 51
103	98	92	86	78	70	63	56	50	..	..	..	..	..	" 52
96	92	87	82	77	70	63	57	52	47	..	..	..	..	" 53
92	87	81	75	67	60	53	48	..	..	..	..	..	..	" 54

COMPOUND STANCHIONS.

DIMENSIONS AND PROPERTIES.

Reference Mark	Composed of: Beams	Composed of: Flats	Dimensions in inches: Depth	Dimensions in inches: Width	Area square inches	Weight per foot—lbs.	Radii of Gyration in inches: About XX	Radii of Gyration in inches: About YY
IS 55	24×7½×100	14×⅝	26½	14	64·40	223	11·31	3·14
" 56	20×7½× 89	14×⅝	22½	14	61·17	212	9·59	3·22
" 57	18×7 × 75	14×⅝	20½	14	57·06	198	8·77	3·29
" 58	10×8 × 70	14×⅝	12½	14	55·60	193	5·11	3·40
" 59	24×7½×100	14×½	26	14	57·40	199·5	11·07	3·02
" 60	20×7½× 89	14×½	22	14	54·17	188·5	9·37	3·10
" 61	18×7 × 75	14×½	20	14	50·06	174·5	8·57	3·17
" 62	10×8 × 70	14×½	12	14	48·60	169·5	4·95	3·29
" 63	16×6 × 62	12×⅝	18½	12	48·23	168	7·83	2·83
" 64	15×6 × 59	12×⅝	17½	12	47·35	165	7·42	2·86
" 65	14×6 × 57	12×⅝	16½	12	46·76	163	6·98	2·88
" 66	12×6 × 54	12×⅝	14½	12	45·88	158·5	6·07	2·90
" 67	10×8 × 70	10×⅝	12½	10	45·60	159	4·99	2·47
" 68	16×6 × 62	12×½	18	12	42·23	147·5	7·63	2·73
" 69	15×6 × 59	12×½	17	12	41·35	144·5	7·23	2·76
" 70	14×6 × 57	12×½	16	12	40·76	142·5	6·80	2·78
" 71	12×6 × 54	12×½	14	12	39·88	138·5	5·90	2·81
" 72	9×7 × 58	10×⅝	11½	10	42·06	147	4·60	2·46
" 73	10×8 × 70	10×½	12	10	40·60	142	4·80	2·42
" 74	10×6 × 42	12×½	12	12	36·35	126·5	5·08	2·92
" 75	9×7 × 58	9×⅝	11½	9	39·56	138·5	4·56	2·23
" 76	9×7 × 58	9×½	11	9	35·06	123·5	4·40	2·18
" 77	10×5 × 35	8×⅝	12½	8	30·29	105·5	5·15	1·98
" 78	8×6 × 35	9×½	10	9	28·29	99	4·10	2·22
" 79	10×5 × 30	8×½	12	8	24·82	87	5·04	1·95

COMPOUND STANCHIONS.

SAFE LOADS IN TONS.

ENDS FIXED.

For other conditions of ends see page 65.

SAFE LOADS IN TONS FOR LENGTHS IN FEET														Reference Mark
8	10	12	14	16	18	20	22	24	26	28	32	36	40	
374	368	361	352	342	331	319	306	293	278	262	230	202	177	18 55
356	350	344	336	327	317	306	294	282	269	254	224	198	174	„ 56
333	327	321	314	306	297	287	277	266	254	241	214	189	167	„ 57
325	320	314	308	301	292	283	273	263	253	241	215	191	169	„ 58
333	327	320	311	302	291	280	268	255	241	226	..	..	..	„ 59
315	309	303	295	287	277	267	256	244	232	218	..	..	..	„ 60
291	286	281	274	267	258	249	239	229	218	205	181	159	140	„ 61
283	279	274	268	261	253	245	236	226	216	206	182	161	142	„ 62
278	273	266	258	249	239	228	217	205	191	178	154	133	..	„ 63
273	268	262	254	245	235	225	214	202	189	176	153	132	..	„ 64
270	265	259	251	243	233	223	213	201	188	176	152	132	..	„ 65
265	260	254	247	238	229	220	209	198	186	173	151	131	..	„ 66
260	253	245	235	224	213	200	186	171	158	145	123	..	..	„ 67
243	238	232	224	216	206	196	186	174	162	150	129	111	..	„ 68
238	233	227	220	212	203	193	183	172	160	149	128	110	..	„ 69
235	230	224	217	209	200	191	181	170	159	148	127	110	..	„ 70
230	225	220	213	205	197	188	179	168	157	146	126	109	..	„ 71
240	233	226	217	207	196	184	171	157	145	133	..	..	..	„ 72
231	225	217	208	198	187	175	162	149	137	126	106	..	..	„ 73
210	206	201	196	189	182	175	167	158	148	138	120	104	..	„ 74
223	216	207	197	186	174	160	146	133	122	111	..	..	..	„ 75
197	191	182	173	163	152	139	127	115	105	96	..	..	..	„ 76
168	161	153	143	133	121	109	99	89	80	..	..	..	..	„ 77
160	154	148	141	133	124	114	104	95	87	79	..	..	..	„ 78
138	132	125	117	108	98	88	79	71	64	..	..	..	..	„ 79

COMPOUND STANCHIONS.

DIMENSIONS AND PROPERTIES.

	Reference Mark	Composed of: Beams	Composed of: Flats	Centres of Beams	Dimensions in inches: Depth	Dimensions in inches: Width	Area Square Inches	Weight per foot—lbs.	Radii of Gyration in inches: About XX	Radii of Gyration in inches: About YY
	IS 80	24 × 7½ × 100	18 × ⅝	9½	25¼	18	81·3	280·5	10·35	5·04
	" 81	20 × 7½ × 89	18 × ⅝	9½	21¼	18	74·84	258·5	8·75	5·05
	" 82	18 × 7 × 75	18 × ⅝	9½	19¼	18	66·62	230·5	7·98	5·04
	" 83	18 × 7 × 75	16 × ⅝	8	19¼	16	64·12	222	7·93	4·37
	" 84	16 × 6 × 62	16 × ⅝	8½	17¼	16	56·46	196	7·08	4·49
	" 85	14 × 6 × 57	16 × ⅝	8½	15¼	16	53·52	186	6·31	4·50
	" 86	16 × 6 × 62	16 × ½	8½	17	16	52·46	182·5	6·95	4·48
	" 87	14 × 6 × 57	16 × ½	8½	15	16	49·52	172·5	6·20	4·49
	" 88	14 × 6 × 46	16 × ⅝	8½	15¼	16	47·06	164	6·43	4·51
	" 89	12 × 6 × 54	14 × ⅝	7	13¼	14	49·26	170	5·42	3·85
	" 90	12 × 6 × 54	14 × ½	7	13	14	45·76	158·5	5·32	3·83
	" 91	14 × 6 × 46	16 × ½	8½	15	16	43·06	150·5	6·32	4·50
	" 92	12 × 6 × 44	14 × ⅝	7	13¼	14	43·38	150	5·53	3·86
	" 93	10 × 6 × 42	14 × ⅝	7	11¼	14	42·20	146	4·66	3·87
	" 94	12 × 6 × 44	14 × ½	7	13	14	39·88	138·5	5·43	3·84
	" 95	10 × 6 × 42	14 × ½	7	11	14	38·70	134·5	4·57	3·86
	IS 96	24 × 7½ × 100	18 × ⅝	9½	26½	18	103·8	357	10·96	5·07
	" 97	20 × 7½ × 89	18 × ⅝	9½	22½	18	97·34	335	9·30	5·08
	" 98	18 × 7 × 75	18 × ⅝	9½	20½	18	89·12	307	8·52	5·08
	" 99	18 × 7 × 75	16 × ⅝	8	20½	16	84·12	290	8·45	4·43
	" 100	16 × 6 × 62	16 × ⅝	8½	18½	16	76·46	264	7·61	4·52
	" 101	14 × 6 × 57	16 × ⅝	8½	16½	16	73·52	254	6·79	4·53
	" 102	16 × 6 × 62	16 × ½	8½	18	16	68·46	237	7·41	4·51
	" 103	14 × 6 × 57	16 × ½	8½	16	16	65·52	227	6·61	4·52
	" 104	12 × 6 × 54	14 × ⅝	7	14½	14	66·76	229·5	5·86	3·90
	" 105	14 × 6 × 46	16 × ½	8½	16	16	59·00	205	6·74	4·53
	" 106	12 × 6 × 54	14 × ½	7	14	14	59·70	206	5·69	3·88
	" 107	12 × 6 × 44	14 × ½	7	14	14	53·88	186	5·80	3·89
	" 108	10 × 6 × 42	14 × ½	7	12	14	52·70	182	4·91	3·91
	IS 109	24 × 7½ × 100	18 × ⅝	9½	27¾	18	126·3	435·5	11·47	5·09
	" 110	20 × 7½ × 89	18 × ⅝	9½	23¾	18	119·84	413·5	9·76	5·10
	" 111	18 × 7 × 75	18 × ⅝	9½	21¾	18	111·62	385·5	8·97	5·10
	" 112	18 × 7 × 75	16 × ⅝	8	21¾	16	104·12	360	8·89	4·46
	" 113	16 × 6 × 62	16 × ⅝	8½	19¾	16	96·46	324	8·05	4·54
	" 114	14 × 6 × 57	16 × ⅝	8½	17¾	16	93·52	324	7·21	4·55
	" 115	16 × 6 × 62	16 × ½	8½	19	16	84·46	293·5	7·79	4·53
	" 116	14 × 6 × 57	16 × ½	8½	17	16	81·52	283·5	6·96	4·54
	" 117	12 × 6 × 54	14 × ⅝	7	15¾	14	84·26	290·5	6·25	3·93
	" 118	12 × 6 × 54	14 × ½	7	15	14	73·76	255	6·02	3·91

COMPOUND STANCHIONS.

SAFE LOADS IN TONS.

ENDS FIXED.

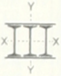
For other conditions of ends see page 68.

SAFE LOADS IN TONS FOR LENGTHS IN FEET														Reference Mark	
10	12	14	16	18	20	22	24	26	28	30	32	36	40		
478	474	470	465	459	453	446	439	431	422	413	403	383	361	18	80
440	437	433	429	423	417	411	404	396	388	380	371	353	333	„	81
392	389	385	381	376	371	366	360	353	346	338	330	314	296	„	82
375	371	366	361	355	349	342	334	326	317	308	298	278	255	„	83
330	327	323	319	314	309	303	296	289	282	274	266	248	230	„	84
313	310	306	302	298	293	287	281	274	267	260	252	237	218	„	85
307	304	300	296	292	287	281	275	269	262	255	247	231	213	„	86
290	287	284	280	276	271	266	260	254	247	240	233	218	202	„	87
275	273	270	266	262	258	253	247	241	235	228	222	208	192	„	88
286	282	279	273	267	260	253	246	238	230	221	212	192	173	„	89
266	262	258	253	248	242	236	228	221	213	205	196	178	160	„	90
252	250	247	244	240	236	231	226	221	215	208	203	190	178	„	91
252	248	244	240	235	229	223	217	210	203	195	187	169	152	„	92
245	242	238	234	229	223	217	211	204	197	190	182	166		„	93
231	228	225	221	216	211	206	199	193	186	178	171	155	140	„	94
226	222	218	214	210	205	199	193	187	181	174	167	151		„	95
611	606	600	594	587	579	570	561	550	539	528	516	490	463	18	96
573	568	563	557	550	543	535	526	516	506	495	484	460	434	„	97
525	520	515	510	504	497	490	482	473	463	453	443	421	398	„	98
492	487	481	474	467	459	450	440	429	417	406	394	368	339	„	99
448	443	438	432	426	419	411	402	393	383	373	362	338	313	„	100
430	426	421	416	410	403	395	387	378	368	358	348	326	302	„	101
401	397	392	387	381	375	367	359	351	342	333	324	305	290	„	102
384	380	375	370	365	359	352	344	336	328	319	310	290	269	„	103
388	383	377	370	363	354	345	335	325	314	302	290	262	237	„	104
348	342	338	334	329	323	317	310	303	296	288	280	262	242	„	105
347	343	337	331	324	317	309	299	290	280	270	259	236	211	„	106
313	309	304	299	292	285	278	270	262	253	244	234	212	191	„	107
308	302	297	292	286	280	272	264	256	246	236	226	206	186	„	108
743	737	730	723	714	705	694	682	670	657	642	626	590	554	28	109
705	700	693	686	678	669	659	648	637	624	611	597	566	530	„	110
657	652	646	639	631	623	614	604	593	581	568	556	528	500	„	111
609	603	596	589	579	569	557	545	532	518	504	490	457	421	„	112
565	559	553	545	537	528	518	507	496	483	470	457	428	396	„	113
546	542	536	529	521	513	503	493	481	469	457	444	416	385	„	114
495	490	484	477	470	463	454	444	434	423	412	400	375	348	„	115
477	473	467	461	454	447	438	429	419	408	396	387	362	335	„	116
480	475	470	463	456	448	436	424	411	397	382	366	335	302	„	117
428	423	416	409	401	391	381	370	359	347	335	321	292	263	„	118

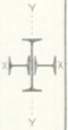
DORMAN, LONG & CO. LIMITED.

COMPOUND STANCHIONS.

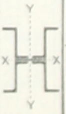
DIMENSIONS AND PROPERTIES.



Reference Mark	COMPOSED OF		Centres of Beams	Dimensions in inches		Area square inches	Weight per foot—lbs.	Radii of Gyration in inches	
	Beams	Flats		Depth	Width			About XX	About YY
IS 119	24×7½×100	24×⅝	7⅞	25¼	24	118·20	410	10·28	6·68
" 120	20×7½× 89	24×⅝	7⅞	21¼	24	108·51	377	8·69	6·70
" 121	18×7 × 75	24×⅝	7⅞	19¼	24	96·18	335	7·93	6·69
" 122	16×6 × 62	20×⅝	6½	17¼	20	79·69	279	7·00	5·55
IS 123	24×7½×100	24×⅝	7⅞	26½	24	148·2	512	10·88	6·73
" 124	20×7½× 89	24×⅝	7⅞	22½	24	138·51	479	9·22	6·75
" 125	18×7 × 75	24×⅝	7⅞	20½	24	126·18	437	8·45	6·75
" 126	16×6 × 62	20×⅝	6½	18½	20	104·69	363	7·51	5·60
IS 127	24×7½×100	24×⅝	7⅞	27¾	24	178·2	618·5	11·37	6·77
" 128	20×7½× 89	24×⅝	7⅞	23¾	24	168·51	585·5	9·68	6·78
" 129	18×7 × 75	24×⅝	7⅞	21¾	24	156·18	543·5	8·89	6·78
" 130	16×6 × 62	20×⅝	6½	19¾	20	129·69	453·5	7·94	5·63



Reference Mark	COMPOSED OF		Dimensions in inches		Area square inches	Weight per foot—lbs.	Radii of Gyration in inches	
	Beams	Beams	Depth	Width			About XX	About YY
IS 131	20×7½×89	10×8×70	20	20⅝	67·37	231	5·18	5·32
" 132	18×7 ×75	9×7×58	18	18½	56·18	193	4·70	4·78
" 133	16×6 ×62	8×6×35	16	16½	38·81	134	4·42	4·00
" 134	14×6 ×57	8×6×35	14	16½	37·34	129	3·90	4·07



Reference Mark	COMPOSED OF		Dimensions in inches		Area square inches	Weight per foot—lbs.	Radii of Gyration in inches	
	Zeds	Flats	Depth	Width			About XX	About YY
ZS 1	8×3½×22·68	10×½	16½	16⅛	31·68	110	4·82	4·70
" 2	7×3½×20·22	9×½	14½	15 3/16	28·29	98	4·26	4·27
" 3	6×3½×17·88	8×½	12½	14¼	25·03	87	3·69	3·85
" 4	5×3 ×14·17	7×½	10½	12 5/16	20·18	70·5	3·07	3·34

COMPOUND STANCHIONS.

SAFE LOADS IN TONS.

ENDS FIXED.

For other conditions of ends see page 55.

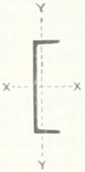
Safe Loads in Tons for Lengths in Feet: 10	12	14	16	18	20	22	24	28	32	36	40	Reference Mark	
701	698	694	689	684	679	673	667	652	637	619	596	DS	119
643	640	637	633	629	624	618	612	600	585	568	550	„	120
570	568	565	561	557	552	548	542	532	519	502	487	„	121
470	467	463	459	454	449	444	438	424	409	392	374	„	122
879	875	870	865	859	852	845	837	820	800	777	752	DS	123
821	818	813	808	803	797	790	782	767	748	727	704	„	124
748	745	741	736	731	725	719	713	698	681	662	641	„	125
618	614	609	604	599	591	584	576	559	538	516	493	„	126
1057	1052	1046	1040	1033	1025	1016	1007	987	962	936	907	DS	127
999	995	990	984	977	969	961	952	932	911	885	858	„	128
926	922	917	912	906	898	891	883	865	844	821	795	„	129
766	761	755	748	741	733	724	715	698	668	641	613	„	130

Safe Loads in Tons for Lengths in Feet: 10	12	14	16	18	20	22	24	26	28	30	32	36	40	Reference Mark	
397	394	390	386	382	377	371	366	358	352	345	336	322	304	DS	131
330	327	323	319	315	310	304	298	292	285	278	271	255	238	„	132
226	223	220	216	212	207	202	197	191	185	178	171	157	142	„	133
217	214	211	207	203	198	192	187	181	175	168	162	147	130	„	134

Safe Loads in Tons for Lengths in Feet: 10	12	14	16	18	20	22	24	26	28	30	32	36	40	Reference Mark	
186	184	182	180	177	174	171	168	165	161	157	153	144	134	SS	1
165	163	161	159	156	153	150	146	142	138	134	130	120	110	„	2
145	143	140	137	134	131	127	123	119	114	109	104	94	84	„	3
115	113	110	107	103	99	95	90	85	80	75	70	...	...	„	4

CHANNEL STANCHIONS.

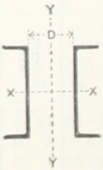
DIMENSIONS AND PROPERTIES.



Reference Mark	Size Inches	Area square inches	Weight per foot lbs.	Radii of Gyration in inches About XX	Radii of Gyration in inches About YY
CS 1	15 ×4	12·334	41·94	5·53	1·09
〃 2	12 ×4	10·727	36·47	4·51	1·13
〃 3	10 ×4	8·871	30·16	3·84	1·16
〃 4	12 ×3½	9·671	32·88	4·44	·96
〃 5	11 ×3½	8·771	29·82	4·12	·98
〃 6	10 ×3½	8·296	28·21	3·77	·99
〃 7	12 ×3½	7·675	26·10	4·55	·99
〃 8	9 ×3½	7·469	25·39	3·43	1·01
〃 9	10 ×3½	6·925	23·55	3·85	1·02
〃 10	8 ×3½	6·682	22·72	3·09	1·03
〃 11	9 ×3½	6·55	22·27	3·49	1·03
〃 12	7 ×3½	5·95	20·23	2·74	1·04
〃 13	6 ×3½	5·266	17·90	2·37	1·06
〃 14*	8 ×3	5·675	19·30	3·07	·87
〃 15	9 ×3	5·696	19·37	3·38	·84
〃 16	7 ×3	5·166	17·56	2·70	·88
〃 17	5⅛×2⅞	4·728	16·08	1·96	·85
〃 18	6 ×3	4·261	14·49	2·37	·91
〃 19	4 ×3	4·175	14·20	1·56	·91

LATTICED CHANNEL STANCHIONS.

DIMENSIONS AND PROPERTIES.



Reference Mark	COMPOSED OF Channels	Distance inches D	Dimensions in inches Depth	Dimensions in inches Width	Area square inches	Radii of Gyration in inches About XX	Radii of Gyration in inches About YY
CS 20	15×4 ×41·94	9½	15	17½	24·67	5·52	5·78
〃 21	12×3½×32·88	6½	12	13½	19·34	4·44	4·22
〃 22	11×3½×29·82	6½	11	13½	17·54	4·11	4·26
〃 23	12×3½×26·1	6½	12	13½	15·35	4·54	4·23
〃 24	10×3½×28·21	4½	10	11½	16·59	3·77	3·33
〃 25	9×3½×25·39	4½	9	11½	14·93	3·43	3·37
〃 26	10×3½×23·55	4½	10	11½	13·85	3·85	3·34
〃 27	9×3½×22·27	4½	9	11½	13·10	3·49	3·39
〃 28	9×3 ×19·37	5½	9	11½	11·39	3·38	3·6
〃 29	7×3 ×17·56	3½	7	9½	10·33	2·7	2·76

CHANNEL STANCHIONS.

SAFE LOADS IN TONS.

ENDS FIXED.

For other conditions of ends see page 55.

SAFE LOADS IN TONS FOR LENGTHS IN FEET										Reference Mark
3	4	5	6	7	8	9	10	11	12	
71	69	67	64	61	57	53	49	45	41	C S 1
62	61	59	57	54	51	48	44	40	36	„ 2
51	50	49	47	45	43	40	37	34	31	„ 3
55	53	51	48	45	42	38	34	30	27	„ 4
50	49	47	44	41	38	35	31	28	25	„ 5
48	46	44	42	39	36	33	30	27	24	„ 6
44	43	41	39	37	34	31	28	25	23	„ 7
43	42	40	38	36	33	30	27	25	23	„ 8
40	39	37	35	33	31	29	26	23	21	„ 9
38	37	36	34	32	30	28	25	23	21	„ 10
38	37	36	34	32	30	27	24	22	20	„ 11
34	33	32	31	29	27	25	23	21	19	„ 12
30	29	28	27	26	24	22	20	18	17	„ 13
32	31	29	27	25	23	20	18	16	...	„ 14*
32	31	29	27	25	23	19	17	...	...	„ 15
29	28	27	25	23	21	18	16	...	...	„ 16
27	26	24	22	20	18	16		...	...	„ 17
24	23	22	21	20	18	16	14	...	...	„ 18
24	23	22	21	19	17	15	14	...	...	„ 19

LATTICED CHANNEL STANCHIONS.

SAFE LOADS IN TONS.

ENDS FIXED.

For other conditions of ends see page 55.

SAFE LOADS IN TONS FOR LENGTHS IN FEET														Reference Mark
10	12	14	16	18	20	22	24	26	28	30	32	36	40	
145	144	143	142	141	139	137	135	133	131	129	127	121	115	C S 20
113	112	110	108	106	104	102	100	97	94	91	88	82	74	„ 21
102	101	100	98	96	94	92	90	88	85	82	79	72	...	„ 22
89	88	87	86	85	83	81	79	77	75	73	71	65	58	„ 23
95	93	91	89	87	84	81	78	75	71	67	63	...	...	„ 24
86	85	83	81	79	76	73	70	67	64	61	...	...	...	„ 25
80	78	76	74	72	70	68	65	62	59	56	53	...	...	„ 26
75	74	73	71	69	67	65	62	59	56	54	...	...	...	„ 27
65	64	63	62	60	58	56	54	52	50	47	...	...	...	„ 28
58	57	55	53	51	48	45	...	...	...	...	...	...	...	„ 29

CHANNEL COMPOUND STANCHIONS.

DIMENSIONS AND PROPERTIES.

	Reference Mark	Composed of: Channels	Composed of: Flats	Distance in inches D	Dimensions in inches: Depth	Dimensions in inches: Width	Area square inches	Weight per foot—lbs.	Radii of Gyration in inches: About X X	Radii of Gyration in inches: About Y Y
	CS 30	15×4 ×41·94	18×⅝	9½	16¼	18	47·17	163	6·71	5·51
	" 31	15×4 ×41·94	18×½	9½	16	18	42·67	147·5	6·55	5·54
	" 32	12×3½×32·88	14×⅝	6½	13¼	14	36·84	128	5·41	4·14
	" 33	11×3½×29·82	14×⅝	6½	12¼	14	35·04	122	5·03	4·15
	" 34	12×3½×32·88	14×½	6½	13	14	33·34	116	5·27	4·15
	" 35	12×3½×26·1	14×⅝	6½	13¼	14	32·85	114·5	5·55	4·13
	" 36	11×3½×29·82	14×½	6½	12	14	31·54	110	4·91	4·16
	" 37	10×3½×28·21	12×⅝	4½	11¼	12	31·59	110	4·57	3·40
	" 38	12×3½×26·1	14×½	6½	13	14	29·35	102·5	5·42	4·14
	" 39	9×3½×25·39	12×⅝	4½	10¼	12	29·94	104·5	4·18	3·42
	" 40	10×3½×28·21	12×½	4½	11	12	28·59	100	4·45	3·39
	" 41	9×3½×25·39	12×½	4½	10	12	26·94	94	4·07	3·41
	" 42	10×3½×23·55	12×½	4½	11	12	25·85	90·5	4·55	3·40
	" 43	9×3½×22·27	12×½	4½	10	12	25·10	88	4·14	3·42
	" 44	9×3 ×19·37	12×½	5½	10	12	23·39	82	4·14	3·53
	" 45	7×3 ×17·56	10×½	3½	8	10	20·33	72	3·26	2·82
	" 46	7×3 ×17·56	10×⅜	3½	7¾	10	17·83	63·5	3·15	2·82
	CS 47	15×4 ×41·94	18×⅝	9½	17½	18	69·67	239·5	7·31	5·41
	" 48	15×4 ×41·94	18×½	9½	17	18	60·67	209	7·1	5·44
	" 49	12×3½×32·88	14×⅝	6½	14½	14	54·34	187·5	5·95	4·10
	" 50	11×3½×29·82	14×⅝	6½	13½	14	52·54	181·5	5·54	4·11
	" 51	12×3½×32·88	14×½	6½	14	14	47·34	163·5	5·75	4·12
	" 52	11×3½×29·82	14×½	6½	13	14	45·54	157·5	5·36	4·12
	" 53	12×3½×26·1	14×½	6½	14	14	43·35	150	5·88	4·11
	" 54	10×3½×28·21	12×⅝	4½	12½	12	46·59	161	5·05	3·42
	" 55	9×3½×25·39	12×⅝	4½	11½	12	44·94	155·5	4·64	3·43
	" 56	10×3½×28·21	12×½	4½	12	12	40·59	141	4·87	3·41
	" 57	9×3½×25·39	12×½	4½	11	12	38·94	135	4·47	3·43
	" 58	10×3½×23·55	12×½	4½	12	12	37·85	131·5	4·96	3·42
	" 59	9×3½×22·27	12×½	4½	11	12	37·10	129	4·53	3·44
	" 60	9×3 ×19·37	12×½	5½	11	12	35·39	123	4·55	3·50
	" 61	7×3 ×17·56	10×½	3½	9	10	30·35	106	3·61	2·84
	" 62	7×3 ×17·56	10×⅜	3½	8½	10	25·33	89	3·45	2·84
	CS 63	15×4 ×41·94	18×⅝	9½	18¾	18	92·17	317·5	7·78	5·36
	" 64	15×4 ×41·94	18×½	9½	18	18	78·67	271·5	7·51	5·39
	" 65	12×3½×32·88	14×½	6½	15	14	61·34	212·5	6·12	4·10

DORMAN, LONG & CO. LIMITED.

CHANNEL COMPOUND STANCHIONS.

SAFE LOADS IN TONS.

ENDS FIXED.

For other conditions of ends see page 65.

SAFE LOADS IN TONS FOR LENGTHS IN FEET														Reference Mark
10	12	14	16	18	20	22	24	26	28	30	32	36	40	
278	276	274	272	269	266	263	259	255	251	246	241	231	220	CS 30
252	250	248	246	244	241	238	235	231	227	223	219	210	200	" 31
215	212	209	206	202	198	193	188	183	178	172	166	153	139	" 32
204	202	199	196	193	189	184	179	174	169	164	158	146	133	" 33
194	192	189	186	183	179	175	171	166	161	156	151	139	126	" 34
191	189	186	183	180	177	172	168	163	158	153	148	136	124	" 35
184	182	179	176	173	170	166	162	158	153	148	143	132	120	" 36
182	179	175	171	166	161	156	150	144	137	130	122	109	..	" 37
171	169	167	164	161	158	154	150	146	142	137	132	122	111	" 38
172	169	166	162	158	153	148	142	136	130	124	117	..	..	" 39
165	162	158	154	150	145	140	135	130	124	117	110	98	..	" 40
155	152	149	146	142	138	133	128	123	117	111	105	..	..	" 41
149	146	143	140	136	132	127	122	117	112	106	100	89	..	" 42
145	142	139	136	132	128	124	119	114	109	104	98	..	..	" 43
135	133	130	127	124	121	117	113	109	104	99	94	..	..	" 44
115	112	109	105	101	96	91	86	80	..	..	..	..	..	" 45
101	98	95	92	88	84	80	75	70	..	..	..	..	..	" 46
411	408	405	401	396	392	387	381	375	368	361	354	339	322	CS 47
357	355	353	349	345	341	337	332	327	321	315	309	296	282	" 48
317	313	308	303	298	292	285	277	269	261	253	244	224	203	" 49
306	302	298	294	288	282	275	268	261	253	245	236	217	197	" 50
276	273	269	265	260	254	248	242	235	228	221	213	196	178	" 51
265	262	259	255	250	245	239	233	226	219	212	205	189	171	" 52
253	250	246	242	238	233	227	221	215	209	202	195	179	163	" 53
268	264	258	252	245	238	230	221	212	203	192	181	161	143	" 54
259	254	249	244	237	230	222	214	205	196	186	176	156	..	" 55
234	230	225	220	214	207	200	193	185	176	167	158	140	124	" 56
224	220	216	211	205	199	192	185	178	170	161	152	135	..	" 57
218	214	210	205	199	193	187	180	172	164	156	148	131	116	" 58
214	210	206	201	196	190	184	177	170	162	154	145	129	..	" 59
203	200	197	193	188	182	176	170	163	156	149	141	125	..	" 60
172	167	162	157	151	144	137	129	121	112	104	..	..	..	" 61
143	140	136	131	126	120	114	108	101	94	..	..	..	..	" 62
543	539	535	530	524	518	511	504	495	486	477	467	447	424	CS 63
464	461	457	452	447	442	436	430	423	416	408	400	382	363	" 64
357	353	348	343	336	329	321	313	304	295	285	275	253	229	" 65

TEES AS STRUTS.

SAFE LOADS IN TONS FOR TEES.

ENDS FIXED.

For other conditions of ends see page 65.

Size and Thickness	LENGTH IN FEET									
	2	3	4	5	6	7	8	9	10	12
6 × 4 × ⅜	21·5	21·1	20·5	19·9	19·1	18·2	17·2	16·2	15·0	12·5
" " ½	28·2	27·7	26·9	26·1	25·1	23·8	22·6	21·1	19·5	16·3
" " ⅝	34·7	34·0	33·2	32·1	30·8	29·3	27·7	25·9	23·3	19·9
6 × 3 × ⅜	19·0	18·3	17·4	16·2	14·9	13·4	11·8	10·4	9·1	..
" " ½	24·8	23·9	22·7	21·1	19·4	17·4	15·3	13·4	11·8	..
" " ⅝	30·5	29·4	27·8	25·9	23·7	21·1	18·5	16·2	14·2	..
5 × 4 × ⅜	19·2	18·8	18·3	17·6	16·8	15·9	14·9	13·8	12·6	10·4
" " ½	25·2	24·7	24·0	23·2	22·2	21·0	19·8	18·4	16·8	14·0
5 × 3 × ⅜	16·8	16·2	15·5	14·5	13·4	12·2	10·9	9·6	8·5	..
" " ½	21·9	21·2	20·2	18·9	17·5	15·8	14·0	12·4	10·9	..
4 × 4 × ⅜	16·7	16·2	15·4	14·4	13·3	12·0	10·7	9·4	8·3	..
" " ½	21·9	21·2	20·2	19·0	17·6	16·0	14·2	12·6	11·1	..
4 × 3 × ⅜	14·6	14·1	13·6	12·8	11·9	10·9	9·8	8·7	7·8	..
" " ½	19·0	18·4	17·6	16·6	15·5	14·2	12·7	11·2	9·9	..
3½ × 3½ × ⅜	14·4	13·8	12·9	11·9	10·7	9·3	8·1	7·0	..	..
" " ½	18·9	18·1	17·0	15·7	14·2	12·5	10·8	9·4	..	..
3 × 3 × ⅜	12·1	11·4	10·4	9·3	8·0	6·8	5·7	..	..	..
" " ½	15·8	14·9	13·7	12·3	10·7	9·1	7·7	..	..	..
3 × 2½ × ⅜	11·0	10·5	9·7	8·7	7·6	6·5	5·6	..	..	..
" " ½	14·4	13·7	12·7	11·5	10·1	8·7	7·4	..	..	..
2½ × 2½ × ¼	6·7	6·1	5·3	4·4	3·6	..	..	..	..	..
" " 5/16	8·2	7·5	6·6	5·5	4·5	..	..	..	..	..
" " ⅜	9·7	8·9	7·9	6·6	5·4	..	..	..	..	..
2¼ × 2¼ × ¼	5·9	5·2	4·4	3·6	2·8	..	..	..	..	..
" " ⅜	8·6	7·7	6·6	5·4	4·3	..	..	..	..	..
2 × 2 × ¼	5·1	4·4	3·5	2·7	..	..	..	..	..	..
" " ⅜	7·4	6·5	5·3	4·1	..	..	..	..	..	..
2 × 1½ × ¼	4·4	3·9	3·2	2·5	..	..	..	..	..	..
" " ⅜	6·3	5·5	4·5	3·5	..	..	..	..	..	..
1½ × 2 × ¼	3·9	2·9	..	..	..	..	..	..	..	..
" " 5/16	4·8	3·6	..	..	..	..	..	..	..	..
1¾ × 1¾ × ¼	4·3	3·5	2·7	..	..	..	..	..	..	..
" " 5/16	5·2	4·4	3·4	..	..	..	..	..	..	..
1½ × 1½ × ¼	3·4	2·6	1·9	..	..	..	..	..	..	..

ANGLES AS STRUTS.

SAFE LOADS IN TONS FOR SINGLE EQUAL ANGLES.

ENDS FIXED.

For other conditions of ends see page 65.

Size and Thickness	LENGTH IN FEET													
	2	3	4	5	6	7	8	9	10	12	14	16	18	20
8 × 8 × 5/8*	57·2	56·6	55·9	54·9	53·8	52·5	51·0	49·4	47·6	43·7	39·1	34·4	30·2	26·4
" " 3/4*	68·0	67·4	66·5	65·3	64·0	62·5	60·7	58·7	56·5	51·8	46·3	40·7	35·6	31·2
6 × 6 × 5/8	42·0	41·3	40·4	39·2	37·8	36·1	34·3	32·4	30·2	25·5	21·4	18·0	..	..
" " 3/4	49·9	49·0	47·9	46·5	44·8	42·8	40·6	38·2	35·6	30·0	25·2	21·1	..	..
5 × 5 × 1/2	27·9	27·2	26·3	25·2	23·9	22·4	20·7	18·8	17·0	13·8	..	..	..	..
" " 5/8	34·4	33·6	32·5	31·1	29·4	27·6	25·5	23·2	21·0	17·0	..	..	..	..
4½ × 4½ × ½*	24·9	24·1	23·1	21·8	20·4	18·7	16·8	15·0	13·3	..	..	..	..	..
" " 5/8*	30·6	29·7	28·4	25·9	25·1	23·0	20·7	18·4	16·4	..	..	..	..	..
4 × 4 × ½	21·8	20·9	19·8	18·4	16·3	15·0	13·2	11·5	10·1	..	..	..	..	..
" " 5/8	26·7	25·7	24·3	22·6	20·7	18·4	16·2	14·1	12·4	..	..	..	..	..
3½ × 3½ × 3/8	14·3	13·6	12·7	11·5	10·2	8·8	7·6	6·5	..	..	..	..	..	..
" " ½	18·7	17·8	16·6	15·1	13·3	11·5	9·9	8·5	..	..	..	..	..	..
" " 5/8	22·9	21·8	20·3	18·5	16·3	14·1	12·1	10·4	..	..	..	..	..	..
3 × 3 × 5/16	10·1	9·4	8·6	7·5	6·4	5·4	..	..	..	..	..	..	..	..
" " 3/8	12·0	11·2	10·1	8·8	7·4	6·2	..	..	..	..	..	..	..	..
" " ½	15·6	14·6	13·2	11·5	9·7	8·1	..	..	..	..	..	..	..	..
" " 5/8	19·1	17·8	16·1	14·1	11·8	9·9	..	..	..	..	..	..	..	..
2½ × 2½ × ¼	6·6	5·9	5·1	4·2	3·3	..	..	..	..	..	..	..	..	..
" " 5/16	8·1	7·3	6·3	5·1	4·1	..	..	..	..	..	..	..	..	..
" " 3/8	9·6	8·6	7·4	6·1	4·9	..	..	..	..	..	..	..	..	..
" " ½	12·4	11·2	9·7	7·9	6·3	..	..	..	..	..	..	..	..	..
2¼ × 2¼ × ¼	5·8	5·1	4·3	3·4	..	..	..	..	..	..	..	..	..	..
" " 5/16	7·1	6·2	5·1	4·0	..	..	..	..	..	..	..	..	..	..
" " 3/8	8·4	7·4	6·1	4·3	..	..	..	..	..	..	..	..	..	..
2 × 2 × 3/16	3·8	3·2	2·5	1·9	..	..	..	..	..	..	..	..	..	..
" " ¼	5·0	4·2	3·3	2·6	..	..	..	..	..	..	..	..	..	..
" " 5/16	6·1	5·1	4·0	3·0	..	..	..	..	..	..	..	..	..	..
" " 3/8	7·2	6·1	4·7	3·6	..	..	..	..	..	..	..	..	..	..
1¾ × 1¾ × 3/16	3·2	2·6	1·9	..	..	..	..	..	..	..	..	..	..	..
" " ¼	4·1	3·3	2·5	..	..	..	..	..	..	..	..	..	..	..
" " 5/16	5·1	4·1	3·0	..	..	..	..	..	..	..	..	..	..	..
1½ × 1½ × 3/16	2·5	1·8	..	..	..	..	..	..	..	..	..	..	..	..
" " ¼	3·3	2·4	..	..	..	..	..	..	..	..	..	..	..	..
" " 5/16	4·0	2·9	..	..	..	..	..	..	..	..	..	..	..	..
1¼ × 1¼ × 3/16	1·9	1·2	..	..	..	..	..	..	..	..	..	..	..	..
" " ¼	2·3	1·5	..	..	..	..	..	..	..	..	..	..	..	..

ANGLES AS STRUTS.

SAFE LOADS IN TONS FOR SINGLE UNEQUAL ANGLES. ENDS FIXED.

For other conditions of ends see page 65.

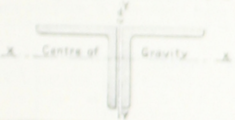
Size and Thickness	LENGTH IN FEET									
	2	3	4	5	6	7	8	9	10	12
7 × 3½ × ⅝	35·7	34·3	32·3	29·8	27·0	23·8	20·7	18·1	..	..
" " ¾	42·3	40·5	38·1	35·1	31·7	27·8	24·2	21·0	..	..
6½ × 4½ × ⅝	38·0	37·1	35·8	34·2	32·3	30·2	27·8	25·2	22·7	18·3
" " ¾	45·1	44·0	42·5	40·6	38·3	35·8	33·0	29·9	26·9	21·7
6 × 4 × ½	27·7	26·9	25·8	24·3	22·6	20·7	18·6	16·5	14·7	..
" " ⅝	34·2	33·2	31·8	30·0	27·9	25·6	22·9	20·4	18·1	..
6 × 3½ × ½	26·1	25·1	23·6	21·9	19·9	17·6	15·3	13·4	11·7	..
" " ⅝	32·2	30·9	29·1	27·0	24·5	21·7	18·9	16·5	14·4	..
6 × 3 × ½	24·3	22·9	21·1	18·9	16·3	13·9	11·7	..	..	..
" " ⅝	29·9	28·3	25·9	23·3	20·1	17·1	14·5	..	..	..
5½ × 3½ × ½	24·6	23·7	22·3	20·7	18·8	16·6	14·5	12·6	11·0	..
" " ⅝	30·3	29·1	27·5	25·4	23·1	20·4	17·8	15·6	13·6	..
5½ × 3 × ½*	22·9	21·7	20·0	18·0	15·6	13·3	11·3	..	..	..
" " ⅝*	28·2	26·6	24·4	21·9	18·9	16·1	13·6	..	..	..
5 × 4 × ½	24·8	24·0	22·9	21·6	20·0	18·3	16·3	14·4	12·8	..
" " ⅝	30·5	29·5	28·2	26·5	24·5	22·3	19·8	17·5	15·5	..
5 × 3½ × ½	23·2	22·3	21·0	19·5	17·7	15·6	13·6	11·9	10·4	..
" " ⅝	28·5	27·3	25·7	23·8	21·6	19·0	16·5	14·4	12·5	..
5 × 3 × ½	21·5	20·3	18·7	16·8	14·6	12·4	10·6	..	..	..
" " ⅝	26·4	24·9	23·0	20·7	17·9	15·3	13·0	..	..	..
4½ × 3½ × ½*	21·7	20·8	19·6	18·1	16·4	14·4	12·6	11·0	..	..
" " ⅝*	26·7	25·6	24·1	22·3	20·2	17·8	15·5	13·5	..	..
4 × 3 × ⅜	14·2	13·5	12·4	11·1	9·7	8·2	7·0	..	..	..
" " ½	18·6	17·5	16·1	14·4	12·5	10·6	9·0	..	..	..
" " ⅝	22·8	21·5	19·7	17·7	15·3	13·0	11·0	..	..	..
3½ × 3 × 5/16	11·0	10·4	9·5	8·5	7·3	6·2	5·2	..	..	..
" " ⅜	13·1	12·4	11·3	10·1	8·7	7·4	6·2	..	..	..
" " ½	17·1	16·1	14·7	13·0	11·1	9·4	8·0	..	..	..
" " ⅝	20·9	19·7	18·0	16·0	13·6	11·5	9·7	..	..	..
3½ × 2½ × 5/16	10·0	9·2	8·2	7·0	5·8	4·8	..	..	..	..
" " ⅜	11·8	10·9	9·7	8·2	6·7	5·5	..	..	..	..
" " ½	15·4	14·2	12·6	10·6	8·8	7·2	..	..	..	..
3 × 2½ × ¼	7·3	6·7	5·9	5·0	4·1	..	..	..	..	..
" " ⅜	10·7	9·9	8·7	7·3	6·0	..	..	..	..	..
" " ½	14·0	12·8	11·3	9·5	7·8	..	..	..	..	..
3 × 2 × ¼	6·4	5·7	4·7	3·7	..	..	..	..	..	..
" " ⅜	9·4	8·2	6·6	5·2	..	..	..	..	..	..
" " ½	12·1	10·6	8·6	6·7	..	..	..	..	..	..
2½ × 2 × ¼	5·7	5·0	4·1	3·2	..	..	..	..	..	..
" " 5/16	7·1	6·2	5·0	3·9	..	..	..	..	..	..
" " ⅜	8·3	7·3	5·9	4·6	..	..	..	..	..	..
2 × 1½ × 3/16	3·1	2·4	1·8	..	..	..	..	..	..	..
" " ¼	4·0	3·1	2·2	..	..	..	..	..	..	..
" " 5/16	4·9	3·8	2·7	..	..	..	..	..	..	..

ANGLES AS STRUTS.

SAFE LOADS IN TONS FOR TWO EQUAL ANGLES.

ENDS FIXED.

For other conditions of ends see page 66.



Size and Thickness	d	Radii of Gyration XX	Radii of Gyration YY	2	3	4	5	6	8	10	12	16	20
				LENGTH IN FEET									
8 × 8 × 5/8*	3/8	2·46	3·52	114·8	114·4	113·7	112·9	112·0	109·6	106·7	103·2	94·4	84·0
" " 3/4*	3/8	2·45	3·54	136·7	136·1	135·3	134·4	133·3	130·4	126·9	122·6	112·1	99·7
6 × 6 × 1/2	3/8	1·84	2·70	68·6	68·1	67·4	66·6	65·6	63·2	60·1	56·4	47·8	38·4
" " 5/8	3/8	1·83	2·73	84·8	84·1	83·3	82·3	81·0	78·0	74·1	69·6	58·8	47·2
" " 3/4	3/8	1·81	2·75	100·6	99·8	98·8	97·6	96·1	92·5	87·7	82·2	69·2	55·3
5 × 5 × 1/2	1/2	1·52	2·26	56·5	55·9	55·1	54·1	53·0	50·0	46·4	42·3	32·9	..
" " 5/8	1/2	1·51	2·29	69·7	68·9	67·9	66·7	65·3	61·6	57·1	52·0	40·2	..
4½ × 4½ × 1/2*	1/2	1·36	2·05	50·4	49·8	48·9	47·8	46·6	43·3	39·5	34·9	25·9	..
" " 5/8*	1/2	1·35	2·09	62·1	61·3	60·2	58·9	57·3	53·2	48·4	42·7	31·6	..
4 × 4 × 3/8	1/2	1·22	1·83	33·8	33·3	32·6	31·7	30·6	28·0	24·8	21·2	..	..
" " 1/2	1/2	1·21	1·86	44·3	43·7	42·7	41·5	40·1	36·6	32·4	27·6	..	..
" " 5/8	1/2	1·19	1·89	54·5	53·6	52·4	50·9	49·1	44·6	39·4	33·3	..	..
3½ × 3½ × 5/16	3/8	1·07	1·58	24·7	24·1	23·5	22·6	21·6	19·2	16·3	13·5	..	..
" " 3/8	3/8	1·06	1·59	29·3	28·7	27·9	26·9	25·6	22·7	19·2	15·9	..	..
" " 1/2	3/8	1·05	1·62	38·3	37·5	36·4	35·1	33·4	29·6	24·9	20·5	..	..
" " 5/8	3/8	1·04	1·64	46·9	45·9	44·6	42·9	40·9	36·1	30·2	24·8	..	..
3 × 3 × 1/4	3/8	·92	1·37	16·9	16·4	15·8	15·0	14·1	12·0	9·6	..	..	..
" " 3/8	3/8	·90	1·40	24·7	24·0	23·1	21·9	20·5	17·2	13·8	..	..	..
" " 1/2	3/8	·89	1·43	32·2	31·3	30·1	28·5	26·6	22·2	17·7	..	..	..
" " 5/8	3/8	·88	1·45	39·3	38·2	36·6	34·6	32·4	26·9	21·3	..	..	..
2½ × 2½ × 1/4	3/8	·76	1·17	13·8	13·2	12·5	11·6	10·6	8·2	..	..	..	..
" " 5/16	3/8	·75	1·18	17·0	16·3	15·4	14·2	12·9	10·0	..	..	..	..
" " 3/8	3/8	·75	1·20	20·1	19·3	18·2	16·8	15·3	11·8	..	..	..	..
" " 1/2	3/8	·73	1·23	26·0	24·9	23·4	21·6	19·5	14·9	..	..	..	..
2¼ × 2¼ × 3/16	3/8	·68	1·05	9·3	8·9	8·2	7·5	6·6	4·9	..	..	..	..
" " 1/4	3/8	·68	1·07	12·2	11·6	10·8	9·9	8·7	6·5	..	..	..	..
" " 5/16	3/8	·67	1·09	15·0	14·3	13·3	12·1	10·6	7·8	..	..	..	..
" " 3/8	3/8	·67	1·10	17·8	16·9	15·7	14·2	12·5	9·3	..	..	..	..
2 × 2 × 3/16	3/8	·60	·96	8·1	7·6	6·9	6·1	5·2	..	..	..	..	..
" " 1/4	3/8	·60	·97	10·7	10·0	9·1	8·1	6·8	..	..	..	..	..
" " 5/16	3/8	·59	·99	13·1	12·3	11·1	9·8	8·3	..	..	..	..	..
" " 3/8	3/8	·59	1·00	15·4	14·5	13·1	11·5	9·8	..	..	..	..	..
1¾ × 1¾ × 3/16	3/8	·53	·86	7·0	6·4	5·7	4·8	4·0	..	..	..	..	..
" " 1/4	3/8	·52	·88	9·1	8·4	7·4	6·2	5·1	..	..	..	..	..
" " 5/16	3/8	·51	·89	11·1	10·2	8·9	7·4	6·1	..	..	..	..	..
1½ × 1½ × 3/16	3/8	·45	·77	5·8	5·1	4·3	3·4	..	..	..	..	..	..
" " 1/4	3/8	·44	·78	7·5	6·6	5·5	4·4	..	..	..	..	..	..
" " 5/16	3/8	·44	·80	9·1	8·1	6·7	5·3	..	..	..	..	..	..
1¼ × 1¼ × 3/16	3/8	·37	·67	4·5	3·8	2·9	..	..	..	..	..	..	..
" " 1/4	3/8	·36	·69	5·8	4·8	3·7	..	..	..	..	..	..	..

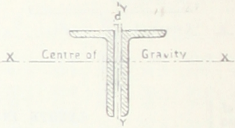
DORMAN, LONG & CO. LIMITED.

ANGLES AS STRUTS.

SAFE LOADS IN TONS FOR TWO UNEQUAL ANGLES.

ENDS FIXED.

For other conditions of ends see page 65.



Size and Thickness	d	Radii of Gyration		LENGTH IN FEET											
		XX	YY	2	3	4	5	6	8	10	12	14	16	18	20
7 × 3½ × ½	⅝	2·24	1·42	59·3	58·7	57·7	56·5	55·2	51·7	47·4	42·5	37·0	32·1	27·7	..
" " ⅝	⅝	2·22	1·45	73·3	72·5	71·4	69·9	68·3	64·2	59·1	53·3	45·6	40·5	35·1	..
" " ¾	⅝	2·21	1·48	86·9	85·9	84·7	83·1	81·2	76·4	70·7	64·0	56·4	49·1	42·8	..
6½ × 4½ × ½	⅝	2·06	1·91	62·6	62·2	61·6	60·9	60·1	58·0	55·4	52·2	48·8	44·9	40·6	36·5
" " ⅝	⅝	2·04	1·94	77·1	76·8	76·1	75·3	74·3	71·8	68·7	64·9	60·7	56·1	50·9	45·8
" " ¾	⅝	2·03	1·96	91·7	91·1	90·3	89·3	88·2	85·3	81·6	77·2	72·4	67·0	60·9	55·0
6½ × 3½ × ⅜	½	2·09	1·37	42·8	42·3	41·6	40·7	39·6	36·9	33·6	29·8	25·8	22·2	19·1	..
" " ½	½	2·07	1·40	56·4	55·7	54·8	53·6	52·3	48·9	44·7	39·9	34·7	30·0	25·9	..
" " ⅝	½	2·06	1·43	69·6	68·7	67·7	65·3	64·7	60·7	55·8	50·1	43·7	37·9	32·8	..
6 × 4 × ⅜	½	1·91	1·64	43·0	42·6	42·1	41·4	40·6	38·8	36·3	33·6	30·5	27·0	23·8	21·0
" " ½	½	1·90	1·67	56·6	56·1	55·4	54·6	53·6	51·2	48·1	44·6	40·7	36·2	32·0	28·3
" " ⅝	½	1·88	1·69	69·3	69·2	68·4	67·4	66·2	63·3	59·6	55·4	50·6	45·2	40·0	35·4
6 × 3½ × ⅜	½	1·92	1·41	40·6	40·2	39·5	38·7	37·7	35·3	32·4	29·0	25·1	21·8	18·8	..
" " ½	½	1·91	1·44	53·5	52·9	52·0	51·0	49·8	46·7	43·0	38·7	33·8	29·3	25·4	..
" " ⅝	½	1·89	1·47	65·9	65·2	64·2	63·0	61·6	57·9	53·5	48·4	42·5	37·0	32·2	..
6 × 3 × ⅜	½	1·93	1·19	38·3	37·7	36·8	35·7	34·5	31·3	27·7	23·4	19·7	..	..	..
" " ½	½	1·91	1·22	50·3	49·5	48·5	47·1	45·6	41·6	37·0	31·5	26·7	22·5	..	..
" " ⅝	½	1·89	1·25	62·0	61·1	59·8	58·3	56·4	51·7	46·3	39·8	33·8	28·7	..	..
5½ × 3½ × ⅜	½	1·75	1·45	38·4	38·0	37·4	36·7	35·8	33·6	31·0	27·9	24·5	21·3	18·4	..
" " ½	½	1·73	1·48	50·5	50·0	49·2	48·3	47·2	44·5	41·1	37·2	32·8	28·6	24·9	..
" " ⅝	½	1·73	1·50	62·2	61·6	60·7	59·6	58·3	55·0	50·9	45·3	40·9	35·7	31·1	..
5½ × 3 × ⅜*	½	1·76	1·22	36·1	35·5	34·8	33·8	32·7	29·8	26·5	22·6	19·1	16·2	..	..
" " ½*	½	1·75	1·25	47·4	46·7	45·7	44·6	43·1	39·5	35·4	30·4	25·9	21·9	..	..
" " ⅝*	½	1·73	1·28	58·3	57·5	56·4	55·0	53·3	49·1	44·2	38·3	32·7	27·8	..	..
5 × 4 × ⅜	½	1·57	1·73	38·5	38·1	37·6	37·0	35·2	34·4	32·0	29·4	26·3	23·2	..	..
" " ½	½	1·56	1·76	50·6	50·1	49·4	48·6	47·6	45·1	42·0	38·5	34·4	30·2	..	..
" " ⅝	½	1·54	1·79	62·3	61·6	60·8	59·7	58·5	55·3	51·4	47·0	41·9	36·7	..	..
5 × 3½ × ⅜	½	1·58	1·49	36·2	35·9	35·3	34·7	33·9	31·9	29·6	26·8	23·7	20·6	..	..
" " ½	½	1·57	1·52	47·6	47·1	46·4	45·6	44·6	42·2	39·1	35·7	31·6	27·7	..	..
" " ⅝	½	1·55	1·55	58·6	58·0	57·2	56·2	55·1	52·2	48·5	44·4	39·6	34·8	..	..

ANGLES AS STRUTS.

SAFE LOADS IN TONS FOR TWO UNEQUAL ANGLES. ENDS FIXED.

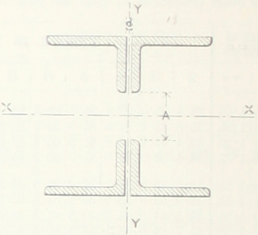
For other conditions of ends see page 66.

Size and Thickness	d	Radii of Gyration		Length in Feet									
		XX	YY	2	3	4	5	6	8	10	12	14	16
5 × 3 × 5/16	½	1·60	1·24	28·4	28·0	27·4	26·7	25·8	23·7	21·1	18·1	15·4	13·0
" " 3/8	½	1·59	1·26	33·8	33·4	32·6	31·9	30·8	28·3	25·4	21·9	18·6	15·8
" " 1/2	½	1·58	1·29	44·4	43·8	43·0	41·9	40·7	37·5	33·8	29·4	25·1	21·4
" " 5/8	½	1·56	1·32	54·6	53·9	52·9	51·7	50·2	46·5	42·1	36·9	31·6	27·1
4½ × 3½ × 5/16*	½	1·42	1·52	28·5	28·2	27·7	27·2	26·5	24·8	22·8	20·4	17·8	15·4
" " 3/8*	½	1·41	1·53	33·9	33·5	33·0	32·3	31·5	29·5	27·0	24·2	21·0	18·2
" " 1/2*	½	1·40	1·56	44·5	44·0	43·2	42·3	41·3	38·6	35·3	31·5	27·3	23·6
" " 5/8*	½	1·38	1·59	54·7	54·0	53·1	51·9	50·6	47·2	43·1	38·3	33·1	28·6
4 × 3½ × 5/16	½	1·24	1·57	26·6	26·2	25·6	25·0	24·2	22·1	19·7	16·9	14·4	..
" " 3/8	½	1·24	1·58	31·6	31·1	30·5	29·7	28·7	26·3	23·5	20·1	17·1	..
" " 1/2	½	1·22	1·61	41·4	40·8	39·9	38·8	37·5	34·2	30·4	26·0	22·0	..
" " 5/8	½	1·21	1·64	50·8	50·0	48·9	47·6	45·9	41·9	37·1	31·6	26·7	..
4 × 3 × 5/16	½	1·26	1·32	24·8	24·4	23·9	23·3	22·6	20·7	18·6	16·0	13·6	..
" " 3/8	½	1·25	1·34	29·4	29·0	28·4	27·7	26·8	24·6	22·0	18·9	16·0	..
" " 1/2	½	1·24	1·37	38·5	37·9	37·1	36·1	35·0	32·0	28·6	24·5	20·8	..
" " 5/8	½	1·22	1·40	47·1	46·4	45·4	44·2	42·7	39·0	34·6	29·6	25·0	..
3½ × 3 × 5/16	⅜	1·08	1·32	22·8	22·3	21·7	21·0	20·1	17·9	15·2	12·6	..	..
" " 3/8	⅜	1·08	1·34	27·1	26·6	25·8	24·9	23·8	21·2	18·1	15·0	..	..
" " 1/2	⅜	1·06	1·37	35·4	34·6	33·7	32·4	31·0	27·5	23·2	19·1	..	..
" " 5/8	⅜	1·05	1·40	43·3	42·3	41·2	39·6	37·8	33·4	28·1	23·2	..	..
3½ × 2½ × 5/16	⅜	1·10	1·08	21·0	20·6	20·0	19·3	18·5	16·4	14·0	11·6	..	..
" " 3/8	⅜	1·09	1·10	24·9	24·4	23·8	23·0	22·0	19·6	16·7	13·9	..	..
" " 1/2	⅜	1·08	1·13	32·5	31·8	30·9	29·9	28·6	25·4	21·7	17·9	..	..
3 × 2½ × 1/4	⅜	·93	1·12	15·4	15·0	14·4	13·7	12·9	11·0	8·9	..	..	..
" " 3/8	⅜	·92	1·15	22·5	21·9	21·1	20·1	18·8	16·0	12·8	..	..	..
" " 1/2	⅜	·91	1·17	29·3	28·5	27·4	26·0	24·4	20·6	16·5	..	..	..
3 × 2 × 1/4	⅜	·94	·87	13·9	13·5	12·9	12·2	11·4	9·4	7·4	..	..	..
" " 3/8	⅜	·93	·91	20·3	19·7	19·0	18·0	16·9	14·3	11·4	..	..	..
" " 1/2	⅜	·92	·94	26·4	25·6	24·7	23·5	22·1	18·7	15·0	..	..	..
2½ × 2 × 1/4	⅜	·77	·92	12·3	11·9	11·2	10·4	9·6	7·5	..	..	..	..
" " 5/16	⅜	·77	·94	15·2	14·6	13·8	12·9	11·8	9·2	..	..	..	..
" " 3/8	⅜	·76	·96	17·9	17·3	16·3	15·1	13·8	10·7	..	..	..	..
2 × 1½ × 3/16	⅜	·62	·71	7·1	6·7	6·1	5·5	4·7	..	..	..	..	..
" " 1/4	⅜	·62	·73	9·3	8·8	8·0	7·2	6·1	..	..	..	..	..
" " 5/16	⅜	·61	·75	11·4	10·7	9·8	8·7	7·4	..	..	..	..	..

ANGLES AS STRUTS.

SAFE LOADS IN TONS FOR FOUR UNEQUAL ANGLES LACED. ENDS FIXED.

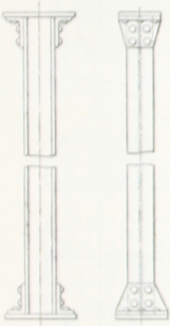
For other conditions of ends see page 65.



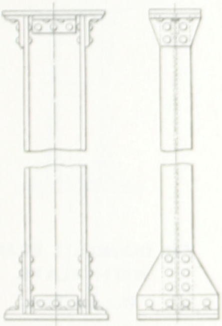
For the Sections given, the least radius of Gyration will be about **YY**, as, for this to be otherwise the distance **A** would have to be less than ½″.

Size and Thickness	d	Radius of Gyration YY	LENGTH IN FEET 6	8	10	12	14	16	18	20	22	24	26
6 × 4 × ½	½	2·91	111·6	109·9	107·7	105·2	102·3	98·9	95·1	91·2	86·9	82·2	77·1
" " ⅝	½	2·95	137·7	135·7	133·1	130·1	126·5	122·4	117·9	113·1	108·0	102·4	96·3
6 × 3½ × ½	½	3·00	105·9	104·4	102·4	100·2	97·6	94·5	91·1	87·5	83·7	79·5	..
" " ⅝	½	3·03	130·6	128·7	126·4	123·7	120·5	116·8	112·7	108·3	103·7	98·7	..
5½ × 3½ × ½	½	2·72	99·6	97·9	95·7	93·2	90·1	86·7	82·9	78·9	74·6	69·8	..
" " ⅝	½	2·76	122·7	120·6	118·0	115·0	111·4	107·3	102·7	97·9	92·7	87·0	..
5 × 4 × ⅜	½	2·36	75·3	73·5	71·4	68·8	65·8	62·5	58·9	54·9	50·6	46·4	42·6
" " ½	½	2·39	99·0	96·7	94·0	90·7	86·8	82·5	77·9	72·9	67·3	61·8	56·7
" " ⅝	½	2·41	121·9	119·2	115·9	111·9	107·2	102·0	96·4	90·3	83·5	76·7	70·5
5 × 3½ × ⅜	½	2·43	71·0	69·5	67·6	65·3	62·6	59·6	56·4	52·9	49·0	45·0	..
" " ½	½	2·46	93·3	91·3	88·9	85·9	82·5	78·6	74·5	70·0	65·0	59·9	..
" " ⅝	½	2·49	114·9	112·5	109·6	105·0	101·8	97·2	92·2	86·8	80·8	74·6	..
5 × 3 × ⅜	½	2·50	66·7	65·3	63·6	61·6	59·2	56·5	53·7	50·5	..	..	..
" " ½	½	2·53	87·5	85·8	83·6	81·0	77·9	74·4	70·8	66·8	..	..	..
" " ⅝	½	2·56	107·6	105·6	103·0	99·8	96·1	91·9	87·5	82·7	..	..	..
4½ × 3½ × ⅜*	½	2·16	66·1	64·3	62·1	59·3	56·2	52·9	49·1	45·0	41·0	37·3	..
" " ½*	½	2·19	86·7	84·4	81·6	78·1	74·1	69·8	65·1	59·7	54·5	49·6	..
" " ⅝*	½	2·21	106·7	103·9	100·5	95·1	91·4	86·2	80·5	74·0	67·5	61·6	..
4 × 3 × 5/16	½	1·95	48·0	46·4	44·4	41·9	39·3	36·3	33·0	29·7	..	..	..
" " ⅜	½	1·97	57·0	55·2	52·9	50·0	46·9	43·5	39·6	35·7	..	..	..
" " ½	½	1·99	74·7	72·3	69·3	65·7	61·7	57·3	52·2	47·2	..	..	..
" " ⅝	½	2·02	91·6	88·9	85·3	80·9	76·2	70·9	64·9	58·7	..	..	..
3½ × 3 × 5/16	⅜	1·64	43·5	41·5	38·9	36·0	32·6	28·9	25·5	22·5	..	..	..
" " ⅜	⅜	1·66	51·8	49·5	46·4	43·0	39·1	34·8	30·3	27·2	..	..	..
" " ½	⅜	1·68	67·8	64·8	60·9	56·6	51·6	46·0	40·7	36·0	..	..	..
" " ⅝	⅜	1·71	83·1	79·5	75·0	69·8	63·9	57·2	50·8	45·0	..	..	..

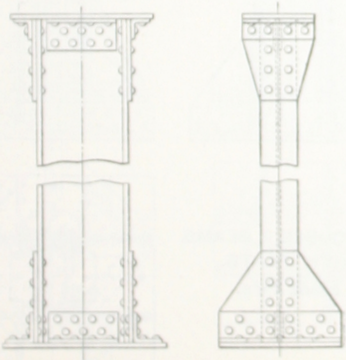
TYPES OF BASES & CAPS FOR STANCHIONS



FOR SMALL I BEAMS.

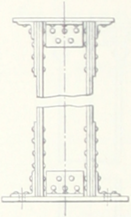


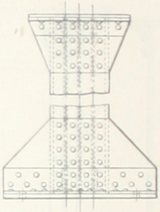
FOR MEDIUM I BEAMS.

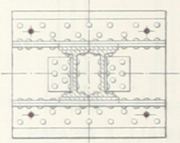


FOR LARGE I BEAMS.

TYPES OF BASES & CAPS FOR STANCHIONS

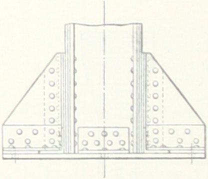


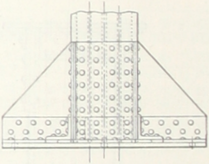


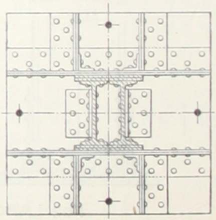


For DOUBLE I BEAMS WITH FLATS.

Medium Type.



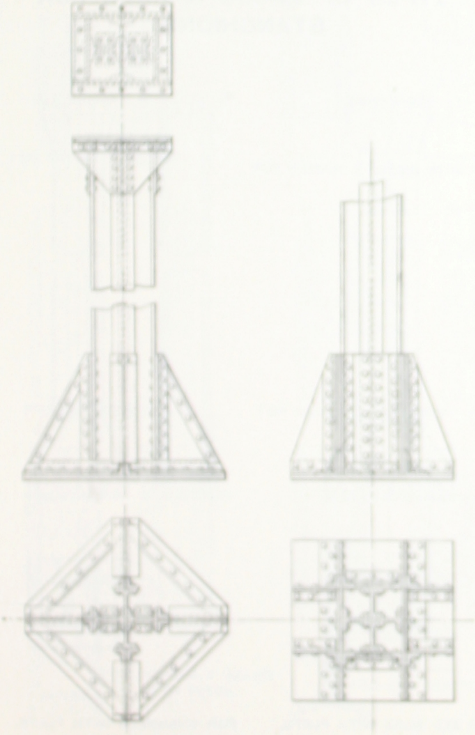




For DOUBLE I BEAMS WITH FLATS.

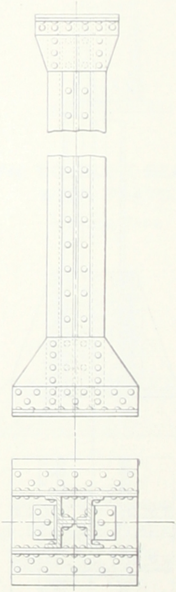
Large Type.

TYPES OF BASES & CAPS FOR STANCHIONS

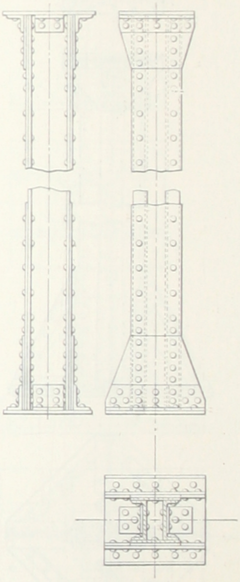


FOR I BEAMS OF CRUCIFORM SECTION.

TYPES OF BASES & CAPS FOR STANCHIONS



FOR ZED BARS WITH FLATS.



FOR CHANNELS WITH FLATS.

TYPES OF JOINTS FOR STANCHIONS

FOR SINGLE I BEAMS.

FOR SINGLE I BEAMS WITH FLATS.

FOR LARGER I BEAMS.

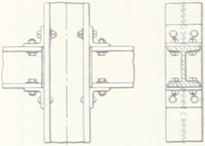
FOR BEAMS OF DIFFERENT SIZES.

FOR DOUBLE I BEAMS WITH FLATS.

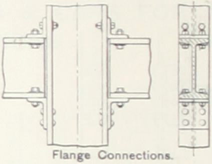
FOR ZED BAR TYPE.

Bolted Connections may be adopted to facilitate erection if found advisable.

TYPE CONNECTIONS OF I BEAMS TO BEAM STANCHIONS

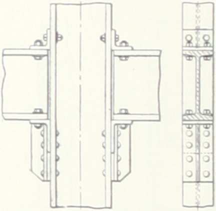


Flange Connections.

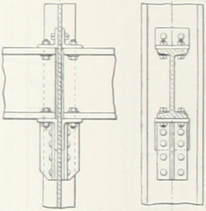


Flange Connections.

SIMPLE ANGLE STOOLS AND TOP CLEATS FOR I BEAMS.

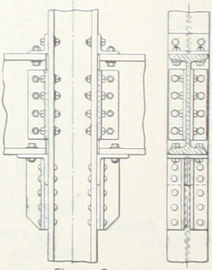


Flange Connections



Web Connections.

BUILT STOOLS AND TOP CLEATS FOR I BEAMS



Flange Connections.

BUILT STOOLS, SIDE AND TOP CLEATS FOR I BEAMS.

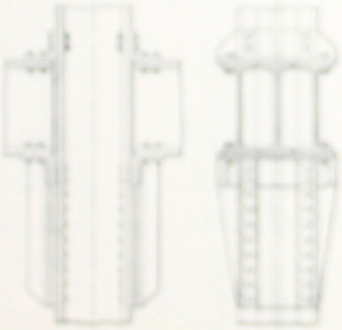
(where greater rigidity is required)

TYPE CONNECTIONS OF I BEAM COMPOUNDS TO BEAM COMPOUND STANCHIONS

Flange Connections

Web Connections

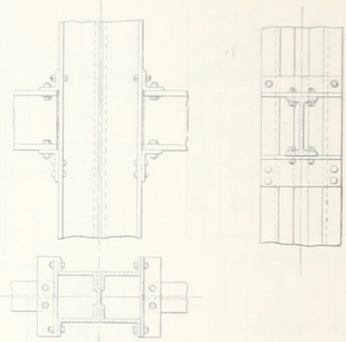
BUILT STOOLS AND TOP CLEATS FOR I BEAM COMPOUNDS



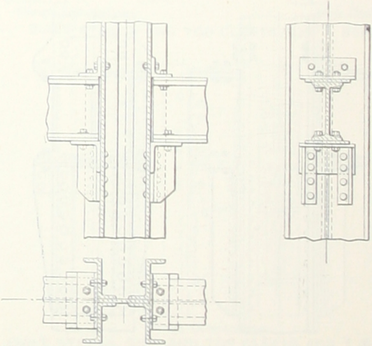
Flange Connections

GUSSETED STOOLS AND TOP CLEATS FOR I BEAM COMPOUNDS

TYPE CONNECTIONS OF I BEAMS AND COMPOUNDS TO ZED BAR STANCHIONS



SIMPLE ANGLE STOOLS AND TOP CLEATS FOR I BEAMS.



BUILT STOOLS AND TOP CLEATS FOR I BEAM COMPOUNDS.

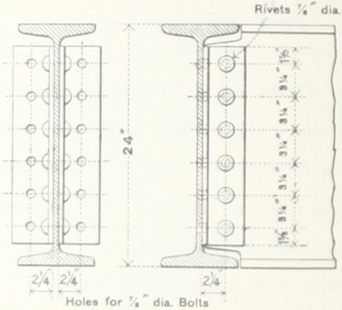
STANDARD CONNECTIONS FOR BEAMS.

Standard Angle Cleats.—The standard angle cleats, illustrated on pages 100 to 103, have been designed for bolted field connections. They have been calculated to withstand reactions equivalent to those produced by the tabular loads on the beams, at the minimum spans given with each standard connection.

Where the reactions are greater than the above, additional support, or special connection, will be necessary.

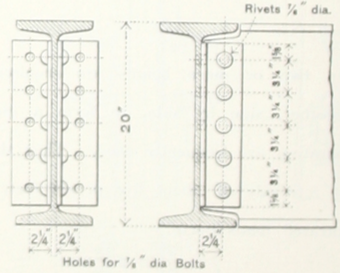
Separators.—When two or more beams are required to be bolted together, side by side, to form a girder, cast iron separators are frequently used. They should be placed at intervals of about five or six feet, and where concentrated loads occur.

STANDARD CONNECTIONS FOR BEAMS



For
B.S.B. 24" × 7½" × 100 lbs
Min Span 22'-0"

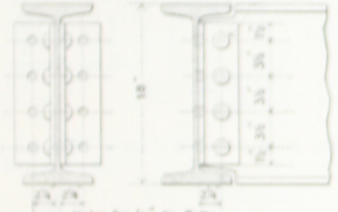
ANGLE CLEATS 4" × 4" × ½" × 1'-7½" LONG. REF. NO. L1



For
B.S.B. 20" × 7½" × 89 lbs
Min. Span 19'-0"

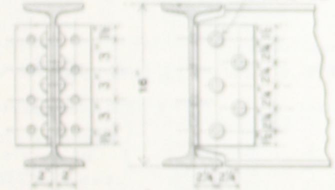
ANGLE CLEATS 4" × 4" × ½" × 1'-4¼" LONG. REF. NO. L2

STANDARD CONNECTIONS FOR BEAMS



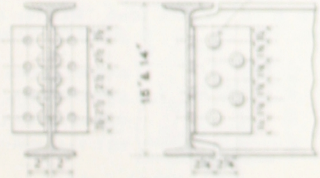
For
B.S.B. 18" × 7" × 75 lbs
Min. Span 18'-0"

ANGLE CLEATS 4" × 4" × ½" × 1'-1½" LONG. REF. NO. L3



For
B.S.B. 16" × 6" × 62 lbs
Min. Span 16'-0"

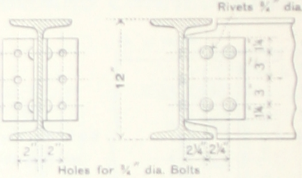
ANGLE CLEATS 6" × 3½" × ⅜" × 1'-0" LONG. REF. NO. L4



For
B.S.B. 15" × 6" × 59 lbs
Min. Span 16'-0"
B.S.B. 15" × 5" × 42 lbs
Min. Span 11'-0"
B.S.B. 14" × 8" × 57 lbs
Min. Span 15'-0"
B.S.B. 14" × 8" × 46 lbs
Min. Span 12'-0"

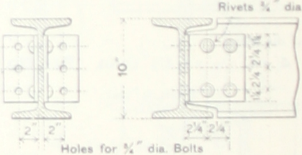
ANGLE CLEATS 6" × 3½" × ⅜" × 10½" LONG. REF. NO. L5

STANDARD CONNECTIONS FOR BEAMS



FOR	MIN. SPAN
B.S.B. 12"×6"×54 lbs	16'-0"
B.S.B. 12"×6"×44 lbs	14'-0"
D.L.B. 12"×5"×39 lbs	12'-0"
B.S.B. 12"×5"×32 lbs	10'-0"

ANGLE CLEATS 6"×3½"×⅜"×8½" LONG. REF. No. L6

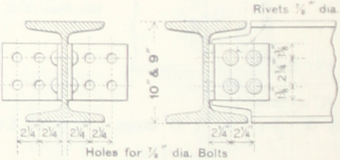


For

B.S.B. 10"×6"×42 lbs

Min. Span 11'-0"

ANGLE CLEATS 6"×3½"×⅜"×7" LONG. REF. No. L7

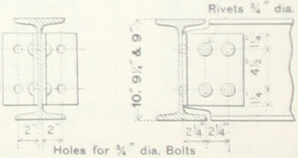


For

B.S.B. 10"×8"×70 lbs
Min. Span 9'-0"

B.S.B. 9"×7"×58 lbs
Min. Span 8'-0"

ANGLE CLEATS 6"×6"×½"×5½" LONG. REF. No. L8



FOR	MIN. SPAN
D.L.B. 10"×5"×35 lbs	13'-0"
B.S.B. 10"×5"×30 lbs	12'-0"
D.L.B. 9¼"×3¾"×21½ lbs	7'-0"
B.S.B. 9"×4"×21 lbs	7'-0"

ANGLE CLEATS 6"×3½"×⅜"×7" LONG. REF. No. L9

STANDARD CONNECTIONS FOR BEAMS

FOR	MIN. SPAN
B.S.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]
D.L.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]

ANGLE CLEATS 6" × 3½" × ½" × 5" LONG. REF. No. L[illegible]

FOR	MIN. SPAN
B.S.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]
D.L.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]
D.L.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]
D.L.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]

ANGLE CLEATS 6" × 3½" × ½" × 3" LONG. REF. No. L[illegible]

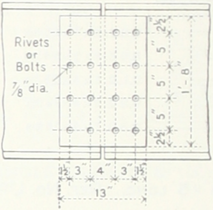
FOR	MIN. SPAN
D.L.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]
D.L.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]

ANGLE CLEATS 6" × 3½" × ½" × 2½" LONG. REF. No. L[illegible]

FOR	MIN. SPAN
D.L.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]
B.S.B. [illegible]	[illegible]

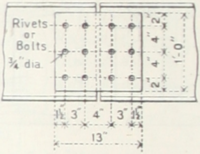
ANGLE CLEATS 6" × 3½" × ½" × 1¾" LONG. REF. No. L[illegible]

STANDARD CONNECTIONS FOR BEAMS



FISHPLATE Ref. No. FP1

For B.S.B. 24" x 7½" x 100 lbs

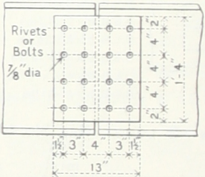


FISHPLATE Ref. No. FP4

For B.S.B. 16" x 6" x 62 lbs

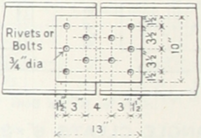
For B.S.B. 15" x 6" x 59 lbs

For B.S.B. 15" x 5" x 42 lbs



FISHPLATE Ref. No. FP2

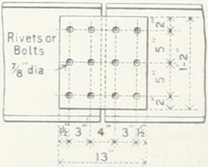
For B.S.B. 20" x 7½" x 89 lbs



FISHPLATE Ref. No. FP5

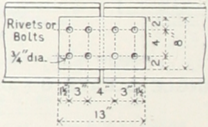
For B.S.B. 14" x 6" x 57 lbs

For B.S.B. 14" x 6" x 46 lbs



FISHPLATE Ref. No. FP3

For B.S.B 18" x 7" x 75 lbs



FISHPLATE Ref. No. FP6

For B.S.B. 12" x 6" x 54 lbs

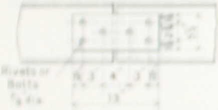
For B.S.B. 12" x 6" x 44 lbs

For D.L.B. 12" x 5" x 39 lbs

For B.S.B. 12" x 5" x 32 lbs

The above Fishplates are for beams supported at joints, and those usually kept in stock are ½" thick for the larger, and ⅜" thick for the smaller sizes.

STANDARD CONNECTIONS FOR BEAMS

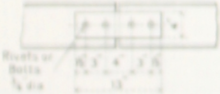


FISHPLATE Ref. No. FP 7

For B.S.B. 10" × 8" × 70 lbs
For B.S.B. 9" × 7" × 58 lbs

FISHPLATE Ref. No. FP 8

For B.S.B. 10" × 6" × 42 lbs
For D.L.B. 10" × 5" × 35 lbs
For B.S.B. 10" × 5" × 30 lbs
For D.L.B. 9½" × 3¾" × 21·5 lbs
For B.S.B. 9" × 4" × 21 lbs



FISHPLATE Ref. No. FP 9

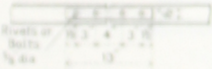
For B.S.B. 8" × 6" × 35 lbs
For B.S.B. 8" × 5" × 28 lbs
For D.L.B. 8" × 4" × 25 lbs
For B.S.B. 8" × 4" × 18 lbs
For B.S.B. 7" × 4" × 16 lbs

FISHPLATE Ref. No. FP 10

For B.S.B. 6" × 5" × 25 lbs
For B.S.B. 6" × 4½" × 20 lbs
For D.L.B. 6" × 3" × 16 lbs
For B.S.B. 6" × 3" × 12 lbs
For D.L.B. 5" × 5" × 24 lbs
For B.S.B. 5" × 4½" × 18 lbs
For D.L.B. 5" × 4⅝" × 19 lbs
For B.S.B. 5" × 3" × 11 lbs

FISHPLATE Ref. No. FP 11

For D.L.B. 4¾" × 1¾" × 10 lbs
For B.S.B. 4¾" × 1¾" × 6·5 lbs
For B.S.B. 4" × 3" × 9·5 lbs
For D.L.B. 4" × 1¾" × 8 lbs
For B.S.B. 4" × 1¾" × 5 lbs

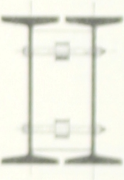


FISHPLATE Ref. No. FP 12

For B.S.B. 3" × 3" × 8·5 lbs
For D.L.B. 3½" × 1½" × 6 lbs
For B.S.B. 3" × 1½" × 4 lbs

The above Fishplates are for beams supported at joints, and those usually kept in stock are ½" thick for the larger, and ⅜" thick for the smaller sizes.

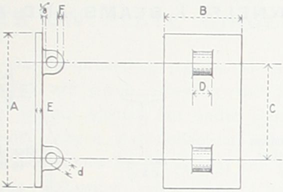
I BEAMS WITH CAST IRON SEPARATORS.



Reference Mark of Beam	Size	Reference Mark of Separator	Centres of Beams	Bolts		
				Diameter	Length	Weight
			In.	In.	In.	Lbs.
B S B 30	24 × 7½ × 100	S^{1}	8	⅞	9¾	4·97
„ 29	20 × 7½ × 89	S^{2}	8	⅞	9¾	4·97
„ 28	18 × 7 × 75	S^{3}	7½	⅞	9½	4·78
„ 27	16 × 6 × 62	S^{4}	6½	¾	8	3·03
„ 26	15 × 6 × 59	S^{4}	6½	¾	8	3·03
„ 25	15 × 5 × 42	S^{5}	6⅜	¾	8	3·03
„ 24	14 × 6 × 57	S^{6}	6½	¾	8	3·03
„ 23	14 × 6 × 46	S^{6}	6⅝	¾	8	3·03
„ 22	12 × 6 × 54	S^{7}	6½	¾	8	3·03
„ 21	12 × 6 × 44	S^{7}	6⅝	¾	8	3·03
D L B 20A	12 × 5 × 39	S^{7}	6⅜	¾	7¾	3·02
B S B 20	12 × 5 × 32	S^{7}	6⅝	¾	7¾	3·02
„ 19	10 × 8 × 70	S^{8}	8½	¾	10¼	1·78
„ 18	10 × 6 × 42	S^{9}	6⅜	¾	8	1·51
D L B 17A	10 × 5 × 35	S^{9}	6⅝	¾	7¾	1·51
B S B 17	10 × 5 × 30	S^{9}	6⅜	¾	7¾	1·51
„ 16	9 × 7 × 58	S^{10}	7½	¾	9	1·65
D L B 15A	9¼ × 3¾ × 21·5	S^{11}	4½	¾	5¾	1·23
B S B 15	9 × 4 × 21	S^{11}	4½	¾	5¾	1·23
„ 14	8 × 6 × 35	S^{11}	6⅜	¾	8	1·51
„ 13	8 × 5 × 28	S^{11}	6⅝	¾	7¾	1·51
D L B 12A	8 × 4 × 25	S^{11}	6⅝	¾	7¾	1·51
B S B 12	8 × 4 × 18	S^{11}	6¼	¾	7½	1·45
„ 11	7 × 4 × 16	S^{11}	4½	¾	5¾	1·23
„ 10	6 × 5 × 25	S^{12}	5⅜	¾	7	1·37
„ 9	6 × 4½ × 20	S^{12}	5⅝	¾	6¾	1·36
D L B 8A	6 × 3 × 16	S^{12}	5⅜	¾	6¾	1·36
B S B 8	6 × 3 × 12	S^{12}	5½	¾	6½	1·32
D L B 7A	5 × 5 × 24	S^{12}	5⅝	¾	6½	1·32
B S B 7	5 × 4½ × 18	S^{12}	5⅜	¾	6½	1·32
D L B 6A	5 × 4⅛ × 19	S^{12}	5⅝	¾	6½	1·32

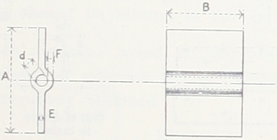
NOTE.—For I Beams of smaller section than 5″ × 4⅛″, single ⅝″ diameter Bolts are used, with Distance Pieces of 1″ gas tubing in lengths cut as required.

STANDARD CAST IRON SEPARATORS.



FOR USE IN BEAMS FROM 24″ × 7½″ TO 12″ × 5″.

Reference No.	DIMENSIONS IN INCHES							Weight in lbs.
	A	B	C	D	E	F	d	
S1	19½	7⅜	13	2	⅝	⅝	1	27·10
S2	16	7⅜	10	2	⅝	⅝	1	22·75
S3	14	6$\frac{15}{16}$	9	2	⅝	⅝	1	19·23
S4	12½	5$\frac{15}{16}$	8	1¾	½	½	⅞	11·78
S5	11½	6	7½	1½	½	½	⅞	10·83
S6	10½	6	7	1½	½	½	⅞	10·01
S7	8½	6	5	1½	½	½	⅞	8·39



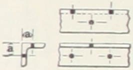
FOR USE IN BEAMS FROM 10″ × 8″ TO 5″ × 4$\frac{3}{16}$″.

Reference No.	DIMENSIONS IN INCHES					Weight in lbs.
	A	B	E	F	d	
S8	6	7⅞	½	⅜	⅞	7·91
S9	7	6$\frac{1}{16}$	½	⅜	⅞	6·9
S10	5¼	6$\frac{15}{16}$	½	⅜	⅞	6·26
S11	6¾	4$\frac{3}{16}$	$\frac{7}{16}$	⅜	⅞	4·3
S12	5¼	6	$\frac{7}{16}$	⅜	⅞	5·1
S13	5	4¼	$\frac{7}{16}$	⅜	⅞	4·09
S14	3	5	$\frac{7}{16}$	⅜	⅞	2·92

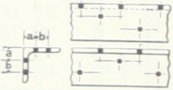
STANDARD SPACING OF HOLES IN FLANGES OF CHANNELS, I BEAMS AND ANGLES.

Size of Flange in inches	Dimensions in inches a
4	2¼
3½	2
3	1¾
2⅞	1½
2⅛	1⅛

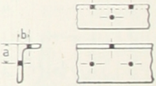
Size of Flange in inches	Centres in inches A
7½	4½
7	4
6	3½
5	2¾
4½	2½
4 3/16	2¼
4	2¼
3	1½



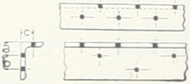
Size of Angle in inches	Dimensions in inches a
4½ × 4½	2½
4 × 4	2¼
3½ × 3½	2
3 × 3	1¾
2½ × 2½	1⅜
2¼ × 2¼	1¼
2 × 2	1⅛
1¾ × 1¾	1
1½ × 1½	⅞
1¼ × 1¼	¾



Size of Angle in inches	Dimensions in inches a	b
8×8	3	3
6×6	2¼	2¼
5×5	2	1¾



Size of Angle in inches	Dimensions in inches a	b
4½ × 3½	2½	2
4 × 3½	2¼	2
4 × 3	2¼	1¾
3½ × 3	2	1¾
3½ × 2½	2	1⅜
3 × 2½	1¾	1⅜
3 × 2	1¾	1⅛
2½ × 2	1⅜	1⅛
2 × 1½	1⅛	⅞



Size of Angle in inches	Dimensions in inches a	b	c
7 × 3½	2½	3	2
6½ × 4½	2½	2½	2½
6½ × 3½	2½	2½	2
6 × 4	2¼	2¼	2¼
6 × 3½	2¼	2¼	2
6 × 3	2¼	2¼	1¾
5½ × 3½	2¼	2	2
5½ × 3	2¼	2	1¾
5 × 4	2	1¾	2¼
5 × 3½	2	1¾	2
5 × 3	2	1¾	1¾

NOTES ON PLATE GIRDERS.

General Note.—On the preceding pages, tables of I beams and compounds are given, shewing the loads carried by each for various spans; but under some conditions, as for instance where the deflection allowed is very small, it will sometimes be found that the plate girders, given in the following pages, may be used with advantage.

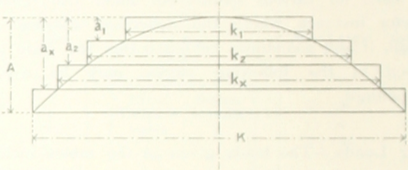
Tabular Loads.—The loads given in the tables include the weights of the girders themselves, and are, in each case, calculated from the modulus of the net section, i.e., both flanges holed. They are based on an extreme fibre stress of 7½ tons per square inch, being one-fourth of the average breaking stress.

When it is considered advisable to adopt any other extreme fibre stress, say f tons per square inch, the tabular loads should be altered in the ratio $\frac{f}{7 \cdot 5}$.

The loads are also based on the assumption that the girders receive efficient lateral support, and the webs are adequately stiffened.

Stiffeners.—The stiffening of plate girders may be effected by means of vertical angles fitting between the inner surfaces of the flange angles, and properly riveted to the web. In the case of girders having double webs, diaphragms may be adopted, which ensure greater unity than that obtained by using outer stiffeners alone. The spacing of the stiffeners depends on the depth of the girder, the thicknesses of web plates, and the purposes for which the girders are required.

Curtailment of Plates.—Where it is not desirable to allow the flange plates to extend the full length of the girder, the limit to which they can be curtailed, for girders supported at both ends and having an uniformly distributed load, may be found as follows:—



Let A = total area of flange, in square inches.

a_1 = area of top plate, in square inches.

a_2 = area of two top plates, in square inches.

a_x = area of number x top plates, in square inches.

K = span of girder, in feet.

k_1 = length of top plate, in feet.

k_2 = length of second plate, in feet.

k_x = length of xth plate, in feet.

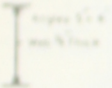
Then:—

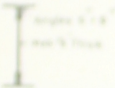
$$k_1 = \frac{K\sqrt{a_1}}{\sqrt{A}} \qquad k_2 = \frac{K\sqrt{a_2}}{\sqrt{A}} \qquad k_x = \frac{K\sqrt{a_x}}{\sqrt{A}}$$

It is customary to make the plates longer than the lengths found by the above formulæ to the extent of about three pitches of rivets at each end, and the plate next to the flange angles is usually the full length of the girder.

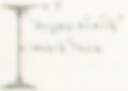
PLATE GIRDERS.

SAFE LOADS IN TONS UNIFORMLY DISTRIBUTED.





Span in feet	Depth over Angles [illegible] inches			Depth over Angles [illegible] inches			Depth over Angles [illegible] inches		Depth over Angles [illegible] inches		Depth over Angles [illegible] inches	
	Thickness of Angles in inches			Thickness of Angles in inches			Thickness of Angles in inches		Thickness of Angles in inches		Thickness of Angles in inches	
	3/8	1/2	5/8	3/8	1/2	5/8	1/2	5/8	1/2	5/8	1/2	5/8
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

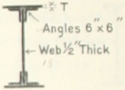


Span in feet	Depth over Angles [illegible] inches Width of Flange [illegible] inches					Depth over Angles [illegible] inches Width of Flange [illegible] inches						
	Total thickness, T, in inches, of flats in one flange					Total thickness, T, in inches, of flats in one flange						
	1/2	5/8	3/4	7/8	1	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Note.—When T exceeds [illegible], two flats should be used.

PLATE GIRDERS.

SAFE LOADS IN TONS UNIFORMLY DISTRIBUTED.



Spans in feet	Depth over Angles 36 inches Angles 6″×6″×½″ Width of Flange 14″					Depth over Angles 42 inches Angles 6″×6″×½″ Width of Flange 14″				
	Total thickness, T, in inches, of flats in one flange					Total thickness, T, in inches, of flats in one flange				
	½	⅝	¾	⅞	1	½	⅝	¾	⅞	1
24	121	..	..	..	..	..	..	..	..	..
26	111	121	..	..	..	135	..	..	..	..
28	104	113	..	..	..	125	136	..	..	..
30	97	106	114	..	..	117	127	138	..	..
32	91	99	107	116	..	109	119	129	139	..
34	85	93	101	109	117	103	112	121	131	140
36	81	88	95	103	110	97	106	115	123	132
38	76	83	90	97	104	92	100	109	117	125
40	72	79	86	92	99	88	95	103	111	119
42	..	..	..	..	..	83	91	98	106	113
44	..	..	..	..	..	80	87	94	101	108
46	..	..	..	..	..	76	83	90	97	103

Spans in feet	Depth over Angles 48 inches Angles 6″×6″×⅝″ Width of Flange 16″						
	Total thickness, T, in inches, of flats in one flange						
	½	⅝	¾	⅞	1	1⅛	1¼
30	158	..	..	..	..	..	..
32	148	161	..	..	..	..	..
34	139	151	..	..	..	..	..
36	131	143	154	..	..	..	..
38	125	135	146	157	..	..	..
40	118	129	139	149	159	..	..
42	113	122	132	142	152	..	..
44	108	117	126	135	145	154	..
46	103	112	121	130	138	147	156
48	99	107	116	124	133	141	150
50	95	103	111	119	127	136	144
52	91	99	107	114	122	130	138
54	88	95	103	110	118	126	133

NOTE.—When T exceeds ¾″, two flats should be used.

DORMAN, LONG & CO. LIMITED.

BOX PLATE GIRDERS.

SAFE LOADS IN TONS UNIFORMLY DISTRIBUTED.

Spans in feet	Depth over Angles 30 inches, Width of Flange 16 inches — Total thickness, T, in inches, of flats in one flange							Depth over Angles 36 inches, Width of Flange 16 inches — Total thickness, T, in inches, of flats in one flange						
	½	⅝	¾	⅞	1	1⅛	1¼	½	⅝	¾	⅞	1	1⅛	1¼
24	94	105	116	127	138	149	..	118	131	145	157	170	..	..
26	87	97	107	117	127	137	147	109	121	133	145	157	169	182
28	81	90	99	109	118	127	137	101	112	124	136	146	157	169
30	75	84	93	101	110	119	128	96	105	115	126	136	147	157
32	71	79	87	96	103	111	120	89	98	108	118	128	138	148
34	67	74	82	90	97	105	113	83	93	102	111	120	130	139
36	..	..	..	..	..	..	..	79	87	96	105	114	122	131
38	..	..	..	..	..	..	..	75	83	91	99	108	116	124
40	..	..	..	..	..	..	..	71	79	87	94	102	110	118

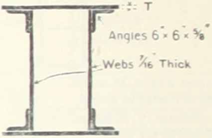
Spans in feet	Depth over Angles 42 inches, Width of Flange 18 inches — Total thickness, T, in inches, of flats in one flange							Depth over Angles 48 inches, Width of Flange 18 inches — Total thickness, T, in inches, of flats in one flange						
	½	⅝	¾	⅞	1	1⅛	1¼	½	⅝	¾	⅞	1	1⅛	1¼
24	152	170	187	205	..	..	..	180	200	220	240	..	..	..
26	140	157	173	189	205	..	..	166	185	203	221	240	..	..
28	130	145	160	175	190	205	..	154	171	189	206	223	240	..
30	122	136	150	164	178	192	206	144	160	176	192	208	224	240
32	114	127	140	153	167	180	193	135	150	165	180	195	210	225
34	107	120	132	144	157	169	181	127	141	155	169	184	198	212
36	101	113	125	136	148	160	171	120	133	147	160	173	187	200
38	96	107	118	129	140	151	162	114	126	139	152	164	177	190
40	91	102	112	123	133	144	154	108	120	132	144	156	168	180
42	87	97	107	117	127	137	147	103	114	126	137	149	160	171
44	83	93	102	112	121	131	140	98	109	120	131	142	153	164
46	79	89	98	107	116	125	134	94	104	115	125	136	146	157
48	76	85	94	102	111	120	129	90	100	110	120	130	140	150
50	..	..	..	..	..	..	..	86	96	106	115	125	134	144
52	..	..	..	..	..	..	..	83	92	102	111	120	129	138
54	..	..	..	..	..	..	..	80	89	98	107	116	124	133

NOTE.—When T exceeds ¾", two flats should be used.

DORMAN, LONG & CO. LIMITED.

BOX PLATE GIRDERS.

SAFE LOADS IN TONS UNIFORMLY DISTRIBUTED.



Spans in feet	Depth over Angles 42 inches Width of Flange 24 inches; Total thickness, T, in inches, of flats in one flange							Depth over Angles 48 inches Width of Flange 24 inches; Total thickness, T, in inches, of flats in one flange						
	½	⅝	¾	⅞	1	1⅛	1¼	½	⅝	¾	⅞	1	1⅛	1¼
24	213	241	..	..	..	..	..	257	..	..	..	..	..	..
26	201	222	244	..	..	..	..	237	262	..	..	..	..	..
28	186	207	227	..	..	..	..	220	243	266	..	..	..	..
30	174	193	212	230	..	..	..	205	227	248	270	..	..	..
32	163	181	198	216	234	..	..	193	213	233	253	273	..	..
34	154	170	187	203	220	237	..	181	200	219	238	257	276	..
36	145	161	176	192	208	224	239	171	189	207	225	243	261	279
38	137	152	167	182	197	212	227	162	179	196	213	230	247	264
40	131	145	159	173	187	201	215	154	170	186	203	219	235	251
42	124	138	151	165	178	192	205	147	162	177	193	208	224	239
44	119	131	144	157	170	183	196	140	155	169	184	199	214	228
46	113	126	138	150	163	175	187	134	148	162	176	190	204	218
48	109	121	132	144	156	168	179	128	142	155	169	182	196	209
50	..	..	..	..	..	..	..	123	136	149	162	175	188	201
52	..	..	..	..	..	..	..	118	131	143	156	168	181	193
54	..	..	..	..	..	..	..	114	126	138	150	162	174	186

NOTE.—When T exceeds ¾", two flats should be used.

NOTES ON ROOFS.

APPROXIMATE WEIGHTS, PER SQUARE FOOT OF GROUND AREA COVERED, FOR STEEL ROOF PRINCIPALS, WITH THE VARIOUS FORMS OF COVERING ENUMERATED BELOW:—

Roof covered with corrugated sheets and steel purlins . .	7 to 9 lbs.
" " " slates and steel purlins	12 " 16 "
" " " slates, 1¼″ boards and steel purlins . .	15 " 20 "

For large spans special calculations should be made.

PRESSURE OF WIND ON ROOFS (PER UNWIN'S FORMULÆ).

a = Angle of surface of roof, with direction of wind.

F = Force of wind in pounds per square foot.

N = Pressure normal to surface of roof = $F.Sin.a^{1 \cdot 84\ Cos.a - 1}$.

V = " perpendicular to direction of wind = $F.Cot.a.Sin.a^{1 \cdot 84\ Cos.a}$.

H = " parellel " " " " = $F.Sin.a^{1 \cdot 84\ Cos.a}$.

PRESSURE OF WIND ON ROOFS WHERE THE PROPORTION OF HEIGHT TO HALF SPAN = 1 : 2.*

F. in lbs. per sq. ft.	5	10	15	20	25	30	35	40	45	50	55	60
N	2·95	5·9	8·85	11·8	14·75	17·7	20·65	23·6	26·55	29·5	32·45	35·4
V	2·65	5·3	7·95	10·6	13·25	15·9	18·55	21·2	23·85	26·5	29·15	31·8
H	1·35	2·7	4·05	5·4	6·75	8·1	9·45	10·8	12·15	13·5	14·85	16·2

PRESSURES OF WIND ON ROOFS.

Angle of Roof a	5°	10°	20°	*26°34′	30°	40°	50°	60°	70°	80°	90°
N = F ×	·125	·24	·45	·59	·66	·83	·95	1·00	1·02	1·01	1·00
V = F ×	·122	·24	·42	·53	·57	·64	·61	·50	·35	·17	·00
H = F ×	·01	·04	·15	·27	·33	·53	·73	·85	·96	·99	1·00

PROPORTIONS OF ROOFS.

Proportion of height to half span	Angle		Proportion of length of Rafter		Proportion of height to half span	Angle		Proportion of length of Rafter	
	Deg.	Min.	to height	to half span		Deg.	Min.	to height	to half span
1/1	45	0	1·41421	1·41421	*1/2	26	34	2·23607	1·11803
1/1·5	33	41	1·80277	1·20185	1/2·5	21	48	2·69258	1·07703
1/$\sqrt{3}$	30	0	2·00000	1·15470	1/3	18	26	3·16228	1·05409

*The proportion, 1:2, of height to half span, has been adopted as meeting general requirements.

ROOF TRUSSES.

Table of Co-efficients for the determination of Stresses, and Lengths of Members, in Roof Trusses, for any span, the proportion of height to half the span being 1 : 2.

To find the Stress in any Member :—

Let S = Span between the points of intersection of the Rafter and Tie.
L = Total Dead Load carried by the Truss, including its own weight.
W = Total Wind Pressure resisted by the Truss, acting on one side of roof, and normal to its surface.
f = Total Stress required.

Then f = (L multiplied by Co-efficient for Dead Load) + (W multiplied by Co-efficient* for Wind Pressure).

* In Trusses of larger spans it is sometimes advisable to provide for expansion, in which case the co-efficient for wind pressure corresponding to "one end free" should be used.

To find the length of any Member between points of intersection :—
Multiply S by the length co-efficient for that member.

NOTE.—The following Stress Co-efficients have been calculated on the assumption that the roof purlins occur over the points of intersection of the various members with the rafter; when such is not the case, bending is produced in the rafter which necessitates further calculation, or allowance being made when deciding its section.

Member of Truss		Stress Co-efficients: Dead Load	Stress Co-efficients: Normal Wind Pressure, Both ends fixed	Stress Co-efficients: Normal Wind Pressure, One end free	Length Co-efficients
FIG. 1.	a b	·838	·875	..	·27950
	b d	·727	·875	..	·27950
	b c	·223	·500	..	·13975
	a c	·750	·978	..	·31250
	c e	·500	·419	..	·18750
	c d	·250	·559	..	·31250
FIG. 2.	a b	·932	1·042	..	·18634
	b d	·758	·820	..	·18634
	d e	·783	1·042	..	·18634
	b c	·179	·401	..	·16797
	d c	·179	·401	..	·16797
	a c	·833	1·165	..	·31250
	c f	·500	·419	..	·18750
	c e	·333	·746	..	·31250
FIG. 3.	a b	·978	1·125	1·125	·13975
	b d	·922	1·125	1·125	·13975
	d f	·866	1·125	1·125	·13975
	f h	·811	1·125	1·125	·13975
	b c	·112	·250	·250	·06987
	f g	·112	·250	·250	·06987
	d e	·224	·500	·500	·13975
	a c	·875	1·258	1·397	·15625
	c e	·750	·978	1·118	·15625
	e j	·500	·419	·559	·18750
	c d	·125	·279	·279	·15625
	d g	·125	·279	·279	·15625
	g h	·375	·838	·838	·15625
	e g	·250	·559	·559	·15625

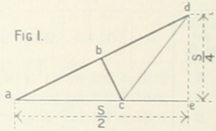


FIG I.

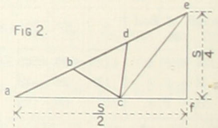


FIG 2.

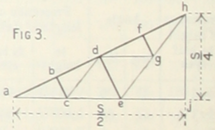


FIG 3.

NOTE.—Heavy lines indicate Compression and light lines Tension Members.

ROOF TRUSSES.

Table of Co-efficients for the determination of Stresses, &c.

	Member of Truss	Stress Co-efficients: Dead Load	Stress Co-efficients: Normal Wind Pressure: Both ends fixed	Stress Co-efficients: Normal Wind Pressure: One end free	Length Co-efficients
FIG. 4.	a b	1·048	1·250	1·250	·06987
	b d	1·020	1·250	1·250	·06987
	d f	·992	1·250	1·250	·06987
	f h	·964	1·250	1·250	·06987
	h k	·936	1·250	1·250	·06987
	k m	·908	1·250	1·250	·06987
	m o	·880	1·250	1·250	·06987
	o q	·852	1·250	1·250	·06987
	b c	·056	·125	·125	·03494
	f g	·056	·125	·125	·03494
	k l	·056	·125	·125	·03494
	o p	·056	·125	·125	·03494
	d e	·112	·250	·250	·06987
	m n	·112	·250	·250	·06987
	h j	·224	·500	·500	·13975
	a c	·937	1·397	1·537	·07812
	c e	·875	1·258	1·397	·07812
	e j	·750	·978	1·118	·15625
	j r	·500	·419	·559	·18750
	c d	·062	·140	·140	·07812
	d g	·062	·140	·140	·07812
	l m	·062	·140	·140	·07812
	m p	·062	·140	·140	·07812
	g h	·187	·419	·419	·07812
	h l	·187	·419	·419	·07812
	e g	·125	·279	·279	·07812
	l n	·125	·279	·279	·07812
	p q	437	·978	·978	·07812
	n p	·375	·838	·838	·07812
	j n	·250	·559	·559	·15625
FIG. 5.	a b	1·025	1·208	1·208	·09317
	b d	·938	1·097	1·097	·09317
	d e	·950	1·208	1·208	·09317
	e g	·913	1·208	1·208	·09317
	g j	·826	1·097	1·097	·09317
	j k	·838	1·208	1·208	·09317
	b c	·090	·200	·200	·08398
	d c	·090	·200	·200	·08398
	g h	·090	·200	·200	·08398
	j h	·090	·200	·200	·08398
	e f	·224	·500	·500	·13975
	a c	·917	1·351	1·491	·15625
	c f	·750	·978	1·118	·15625
	f l	·500	·419	·559	·18750
	c e	·167	·373	·373	·15625
	e h	·167	·373	·373	·15625
	h k	·417	·932	·932	·15625
	f h	·250	·559	·559	·15625

Fig 4

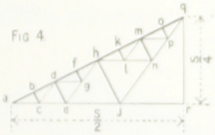
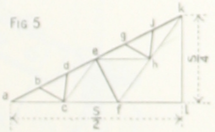
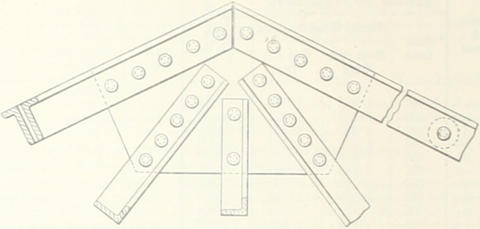


Fig 5

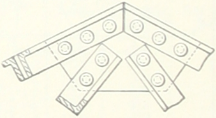


Note.—Heavy lines indicate Compression and light lines Tension Members.

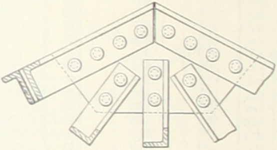
TYPE CONNECTIONS FOR ROOF TRUSSES



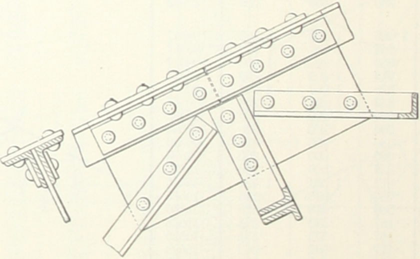
Detail at "q," Fig. 4 & "k," Fig. 5.



Detail at "d," Fig. 1.

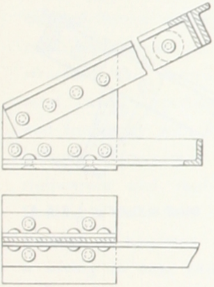


Detail at "h," Fig. 3.

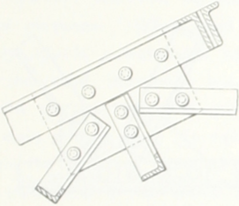


Detail at "h," Fig. 4 & "e," Fig. 5.

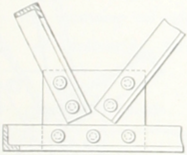
TYPE CONNECTIONS FOR ROOF TRUSSES



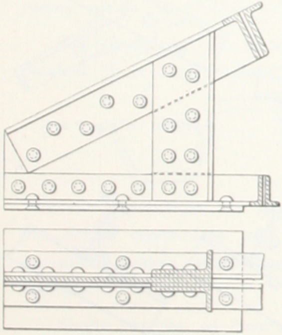
Detail at "a," Figs. 1 & 2.



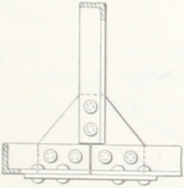
Detail at "d," Figs. 3 & 4.



Detail at "c," Figs. 1, 3 & 4.

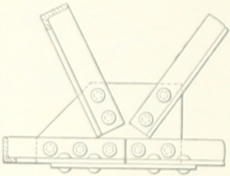


Detail at "a," Figs. 4 & 5.

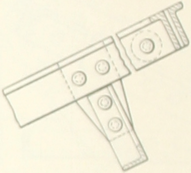


Detail at "r," Fig. 4 & "l," Fig. 5.

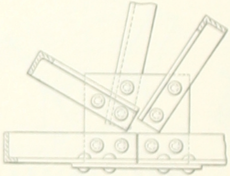
TYPE CONNECTIONS FOR ROOF TRUSSES



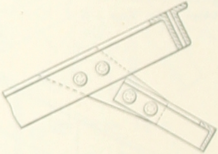
Detail at "e," Figs. 3 & 4.



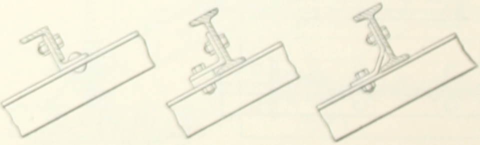
Detail at "b," Figs. 1, 3 & 4.



Detail at "c," Fig. 2.



Detail at "b," Figs. 2 & 5.

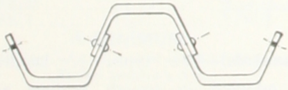


Purlin Cleat Connections.

NOTES ON TROUGHING.

Troughing, as illustrated on the following pages, commands a leading place on the market; and can be recommended for a variety of purposes. When used for road bridges, it not only affords a watertight superstructure for carrying the road metalling, but, in most cases, dispenses with the use of cross girders and frequently with the main girders also. In railway bridges it frequently takes the place of cross girders, railbearers and timber planking; at the same time forming a safer floor in case of derailment. A maximum amount of headway under the bridge is attained, and a saving in cost effected. The smaller sections will be found especially useful for the decking of piers, floors of warehouses, ceilings of subways, strong rooms, etc.

The troughing is usually riveted, before dispatched, in sections of three, thus:—



The site connections are generally made with rivets, but bolted connections may be adopted when found advisable; either method affording easy means of erection.

Single troughs, as illustrated on pages 26 and 27, are frequently used as roof gutters, and permit of the supports being placed at long distances apart.

Dimensions, Properties, Safe Loads, &c.—Diagrams of the various sections of built-up troughing are shewn on pages 123 to 131; and tables, giving dimensions, properties and safe loads, will be found on pages 132 to 134. The properties have been carefully calculated on their correct profiles, all fillets and rounded corners being taken into consideration.

The tabular loads include the weight of the troughing itself, and are calculated from the section modulus of the width "C" shewn on diagrams. They are based on an extreme fibre stress of 6½ tons per square inch.

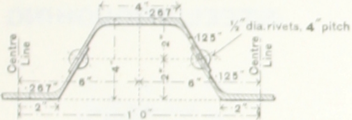
From these particulars the section required to safely carry any specified load may be easily determined.

Examples.—The application of the various sizes of troughing to meet different requirements, together with the necessary calculations, are given on pages 135 to 139.

Handrail Standards.—The types of handrail standards generally adopted in trough bridges are shewn on page 140.

Illustrations of Trough Bridges.—Illustrations shewing the use of troughing as applied to bridge work, will be found on later pages.

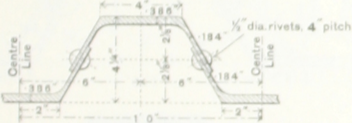
STEEL TROUGHING



O MINIMUM

weight per sq. ft. of covered area = 13·4 lbs

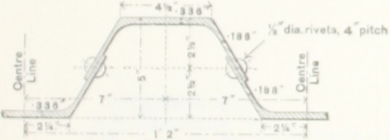
Section Modulus = 4·92



O MAXIMUM

weight per sq. ft. of covered area = 19·06 lbs

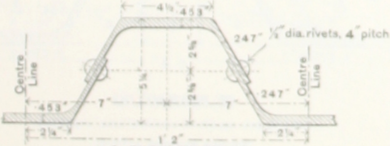
Section Modulus = 6·55



A MINIMUM

weight per sq. ft. of covered area = 17·61 lbs

Section Modulus = 8·4



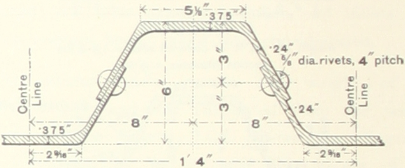
A MAXIMUM

weight per sq. ft. of covered area = 23·1 lbs

Section Modulus = 11·05

FOR PROPERTIES AND SAFE LOADS SEE PAGES 132 & 133.

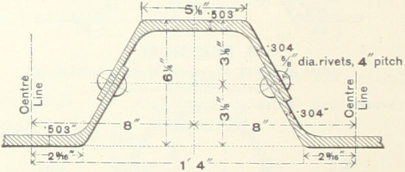
STEEL TROUGHING



B MINIMUM

weight per sq. ft. of covered area = 21·8 lbs

Section Modulus = 13·5



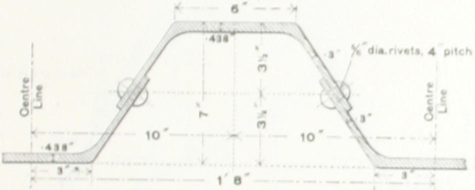
B MAXIMUM

weight per sq. ft. of covered area = 28 lbs

Section Modulus = 17·5

FOR PROPERTIES AND SAFE LOADS SEE PAGES 132 & 133.

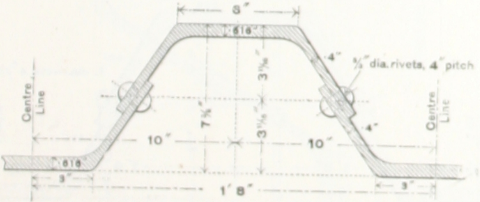
STEEL TROUGHING



C MINIMUM

weight per sq. ft. of covered area = 24·52 lbs

Section Modulus = 21·62



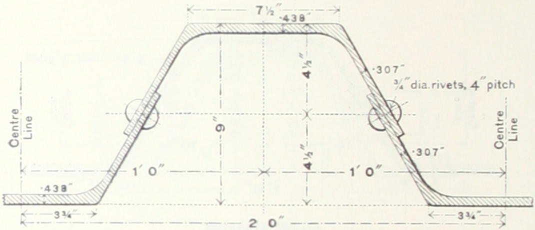
C MAXIMUM

weight per sq. ft. of covered area = 32·97 lbs

Section Modulus = 30·6

FOR PROPERTIES AND SAFE LOADS SEE PAGES 132 & 133.

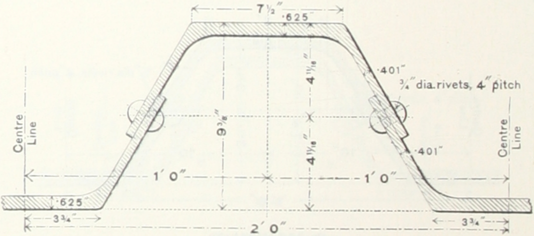
STEEL TROUGHING



C¹ MINIMUM

weight per sq. ft. of covered area = 26·26 lbs

Section Modulus = 36·57



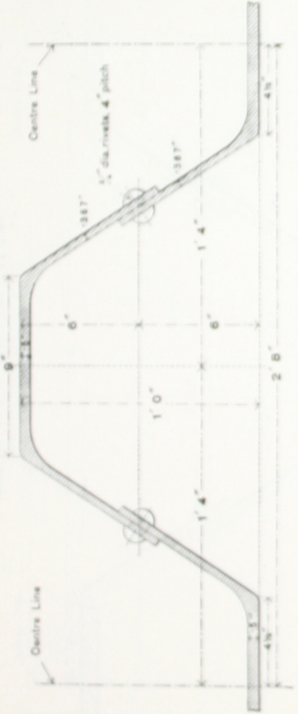
C¹ MAXIMUM

weight per sq. ft. of covered area = 35·02 lbs

Section Modulus = 51·45

FOR PROPERTIES AND SAFE LOADS SEE PAGES 132 & 133.

STEEL TROUGHING



D MINIMUM

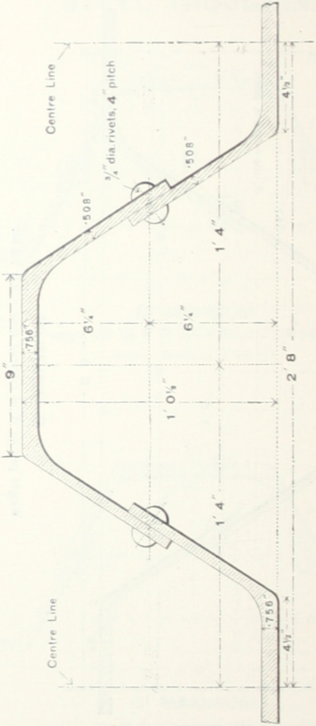
Weight per sq. ft. of covered area = 28·78 lbs

Section Modulus = 72·67

D MINIMUM

FOR PROPERTIES AND SAFE LOADS SEE PAGES 132 & 133.

STEEL TROUGHING



D MEDIUM

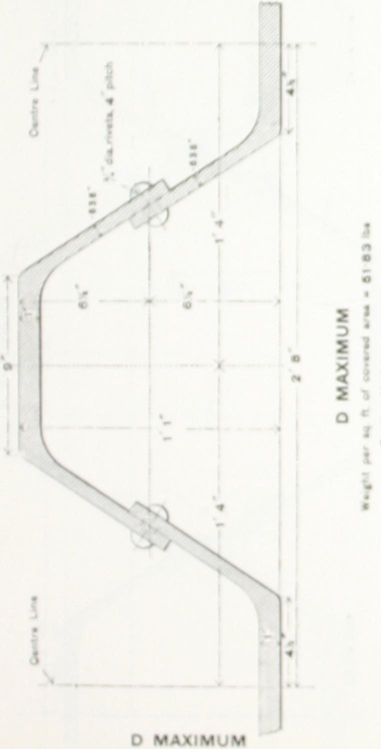
Weight per sq. ft. of covered area = 40·5 lbs

Section Modulus = 103·54

D MEDIUM

FOR PROPERTIES AND SAFE LOADS SEE PAGES 132 & 133.

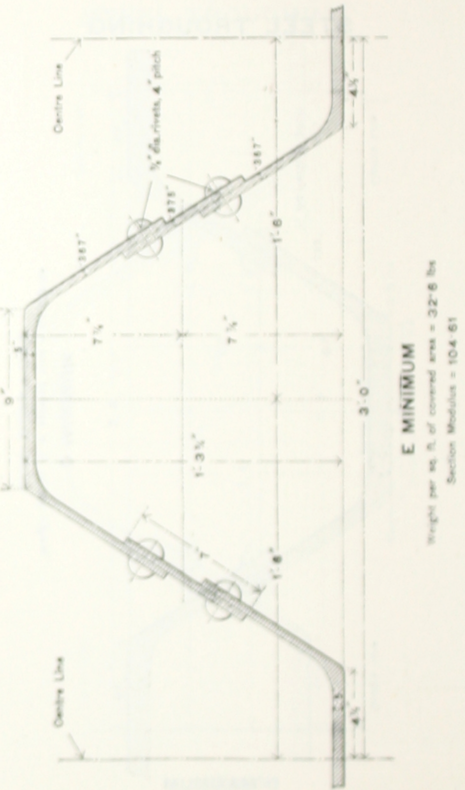
STEEL TROUGHING



D MAXIMUM

FOR PROPERTIES AND SAFE LOADS SEE PAGES 132 & 133.

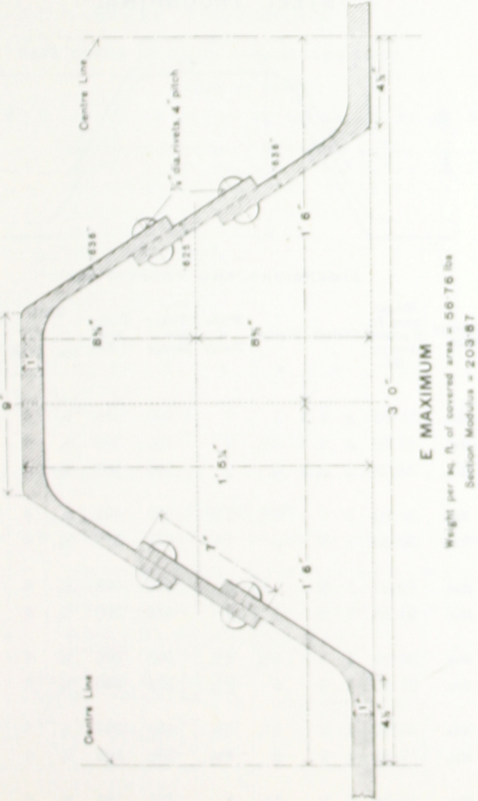
STEEL TROUGHING



E MINIMUM

FOR PROPERTIES AND SAFE LOADS SEE PAGE 134.

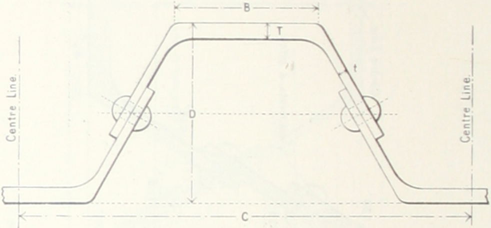
STEEL TROUGHING



E MAXIMUM

FOR PROPERTIES AND SAFE LOADS SEE PAGE 134.

STEEL TROUGHING.



DIMENSIONS AND PROPERTIES.

Reference Mark	Weight per sq. ft. of covered area in lbs.	Centres C		Depths D		Width of Flange B	Thickness of Flange T	Thickness of Web t	Rivets Dia.	Rivets Pitch	Section Modulus for width "C"
		ft.	in.	ft.	in.	ins.	ins.	ins.	ins.	ins.	
D. Max.	51·83	2	8	1	1	9	1·000	·636	¾	4	135·80
D. Med.	40·50	2	8	1	0½	9	·756	·508	¾	4	103·54
D. Min.	28·78	2	8	1	0	9	·500	·367	¾	4	72·67
C¹ Max.	35·02	2	0		9⅜	7½	·625	·401	¾	4	51·45
C¹ Min.	26·26	2	0		9	7½	·438	·307	¾	4	36·57
C Max.	32·97	1	8		7⅜	6	·616	·400	⅝	4	30·60
C. Min.	24·52	1	8		7	6	·438	·300	⅝	4	21·62
B. Max.	28·00	1	4		6¼	5⅛	·503	·304	⅝	4	17·50
B. Min.	21·80	1	4		6	5⅛	·375	·240	⅝	4	13·50
A. Max.	23·10	1	2		5¼	4½	·453	·247	½	4	11·05
A. Min.	17·61	1	2		5	4½	·336	·188	½	4	8·40
O. Max.	19·06	1	0		4¼	4	·386	·184	½	4	6·55
O. Min.	13·40	1	0		4	4	·267	·125	½	4	4·92

STEEL TROUGHING.

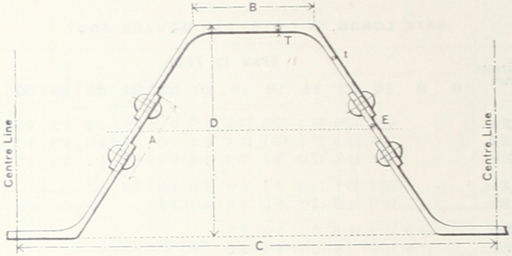
SAFE LOADS IN CWTS. PER SQUARE FOOT.

Reference Mark	SPAN IN FEET													
	6	8	10	12	14	16	18	20	22	24	26	28	30	32
D. Max.	..	..	44·1	30·6	22·5	17·2	13·6	11·0	9·1	7·7	6·5	5·6	4·9	4·3
D. Med.	..	..	33·7	23·4	17·2	13·1	10·4	8·4	7·0	5·8	5·0	4·3	3·7	3·3
D. Min.	..	..	23·6	16·4	12·0	9·2	7·3	5·9	4·9	4·1	3·5	3·0	2·6	..
C^1 Max.	..	..	22·3	15·5	11·4	8·7	6·9	5·6	4·6	3·9	..	..	..	..
C^1 Min.	..	..	15·8	11·0	8·1	6·2	4·9	4·0	3·3	..	..	..	..	..
C. Max.	..	24·8	15·9	11·0	8·1	6·2	4·9	..	..	..	..	..	..	..
C. Min.	..	17·6	11·2	7·8	5·7	4·4	3·5	..	..	..	..	..	..	..
B. Max.	31·6	17·8	11·4	7·9	5·8	4·4	..	..	..	..	..	..	..	..
B. Min.	24·4	13·7	8·8	6·1	4·5	3·4	..	..	..	..	..	..	..	..
A. Max.	22·8	12·8	8·2	5·7	4·2	..	..	..	..	..	..	..	..	..
A. Min.	17·3	9·7	6·2	4·3	3·2	..	..	..	..	..	..	..	..	..
O. Max.	15·8	8·8	5·7	3·9	..	..	..	..	..	..	..	..	..	..
O. Min.	11·8	6·6	4·3	2·9	..	..	..	..	..	..	..	..	..	..

SAFE DISTRIBUTED LOADS IN TONS FOR WIDTH "C."

Reference Mark	SPAN IN FEET													
	6	8	10	12	14	16	18	20	22	24	26	28	30	32
D. Max.	..	..	58·8	49·0	42·0	36·8	32·7	29·4	26·7	24·5	22·6	21·1	19·6	18·4
D. Med.	..	..	44·9	37·4	32·1	28·0	24·9	22·4	20·4	18·7	17·2	16·0	14·9	14·0
D. Min.	..	..	31·5	26·2	22·5	19·7	17·5	15·7	14·3	13·1	12·1	11·2	10·5	..
C^1 Max.	..	..	22·3	18·6	15·9	13·9	12·4	11·1	10·1	9·3	..	..	..	..
C^1 Min.	..	..	15·8	13·2	11·3	9·9	8·8	7·9	7·2	..	..	..	..	..
C. Max.	..	16·6	13·3	11·0	9·5	8·3	7·4	..	..	..	..	..	..	..
C. Min.	..	11·7	9·4	7·8	6·7	5·8	5·2	..	..	..	..	..	..	..
B. Max.	12·6	9·5	7·6	6·3	5·4	4·7	..	..	..	..	..	..	..	..
B. Min.	9·7	7·3	5·8	4·9	4·2	3·6	..	..	..	..	..	..	..	..
A. Max.	8·0	6·0	4·8	4·0	3·4	..	..	..	..	..	..	..	..	..
A. Min.	6·1	4·5	3·6	3·0	2·6	..	..	..	..	..	..	..	..	..
O. Max.	4·7	3·5	2·8	2·4	..	..	..	..	..	..	..	..	..	..
O. Min.	3·5	2·7	2·1	1·8	..	..	..	..	..	..	..	..	..	..

STEEL TROUGHING.



DIMENSIONS AND PROPERTIES.

Reference Mark	Weight per sq. ft. of covered area in lbs.	Centres C	Depths D	Width of Flange B	Thickness of Flange T	Thickness of Web t	Flats: Width A	Flats: Thickness E	Rivets: Dia.	Rivets: Pitch	Section Modulus for width "C"
		ft. in.	ft. in.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	
E. Max.	56·76	3 0	1 5¼	9	1·000	·636	7	⅝	⅞	4	203·87
E. Min.	32·6	3 0	1 3¾	9	·500	·367	7	⅜	⅞	4	104·61

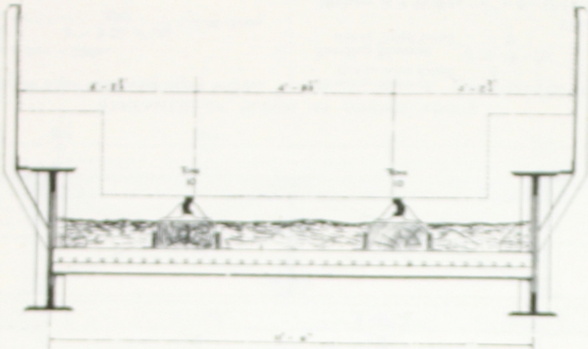
SAFE LOADS IN CWTS. PER SQUARE FOOT.

Reference Mark	SPAN IN FEET													
	14	16	18	20	22	24	26	28	30	32	34	36	38	40
E. Max.	30·0	23·0	18·2	14·7	12·2	10·2	8·7	7·6	6·5	5·7	5·1	4·5	4·1	3·7
E. Min.	15·4	11·8	9·3	7·5	6·2	5·2	4·4	3·8	3·3	2·9	2·6	2·3	2·1	1·9

SAFE DISTRIBUTED LOADS IN TONS FOR WIDTH "C."

Reference Mark	SPAN IN FEET													
	14	16	18	20	22	24	26	28	30	32	34	36	38	40
E. Max.	63·1	55·2	49·1	44·2	40·2	36·8	34·0	31·8	29·4	27·6	26·0	24·5	23·2	22·1
E. Min.	32·4	28·3	25·2	22·7	20·6	18·9	17·4	16·2	15·1	14·2	13·3	12·6	11·9	11·3

APPLICATION OF "C MAX." SECTION TO SINGLE LINE RAILWAY.



STRENGTH OF FLOOR AS SHEWN ABOVE.

Live Load (wheel load 10 Tons) distributed over 3 Widths "C" = 5ft. 0in.

Dead Load per square foot = 145lbs.

Total Dead Load on 3 Widths "C" $= \dfrac{11{\cdot}5' \times 5' \times 145}{2240} = 3{\cdot}72$ Tons

Bending Moment due to Live Load $= 10 \times 3{\cdot}25' \times 12'' = 390$ inch tons

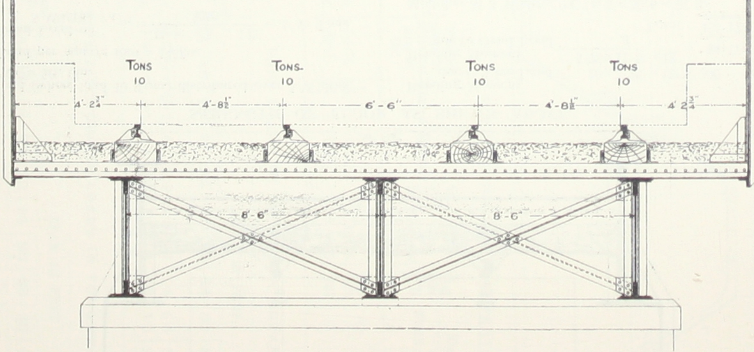
Bending Moment due to Dead Load $= \dfrac{3{\cdot}72 \times 11{\cdot}5' \times 12''}{8} = 64{\cdot}17$ " "

Total $\underline{454{\cdot}17}$ " "

Modulus of 3 Widths "C" $= 3 \times 30{\cdot}6 = 91{\cdot}8$.

<u>Stress</u> $= \dfrac{454{\cdot}17}{91{\cdot}8} = 4{\cdot}94$ <u>Tons per square inch.</u>

APPLICATION OF "B MIN." SECTION TO DOUBLE LINE RAILWAY.



STRENGTH OF FLOOR AS SHEWN ABOVE.

Live Load (wheel load 10 Tons) distributed over 4 Widths, "C" = 5ft. 4in.

Dead Load per square foot = 125lbs.

Total Dead Load on 4 Widths "C" $= \dfrac{8' \times 5{\cdot}33' \times 125}{2240} = 2{\cdot}38$ Tons.

Bending Moment due to Live Load $= \dfrac{10 \times 3{\cdot}12 \times 4{\cdot}88' \times 12''}{8} = 228{\cdot}38$ inch tons

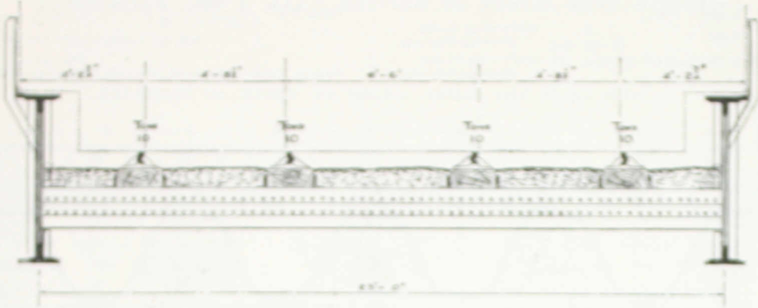
Bending Moment due to Dead Load $= \dfrac{2{\cdot}38 \times 8' \times 12''}{8} = 28{\cdot}56$,, ,,

Total $256{\cdot}94$,, ,,

Modulus of 4 Widths "C" $= 4 \times 13{\cdot}5 = 54$.

Stress $= \dfrac{256{\cdot}94}{54} = 4{\cdot}75$ Tons per square inch.

APPLICATION OF "E MAX." SECTION TO DOUBLE LINE RAILWAY.



STRENGTH OF FLOOR AS SHEWN ABOVE.

Live Load (wheel load 10 Tons) distributed over 2 Widths, "C" = 6ft. 0in.

Dead Load per square foot = 206lbs.

Total Dead Load on 2 Widths "C" = $\frac{23' \times 6' \times 206}{2240}$ = 12·69 Tons.

Bending Moment due to Live Load = (20 × 8·38 − 10 × 5) 12" = 1411·2 inch tons

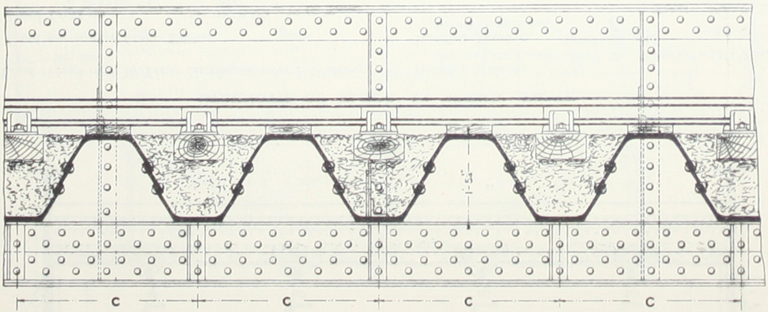
Bending Moment due to Dead Load = $\frac{12 \cdot 69 \times 23' \times 12}{8}$ = 437·8 " "

Total 1849·0 " "

Modulus of 2 Widths "C" = 2 × 203·87 = 407·74.

Stress = $\frac{1849}{407 \cdot 74}$ = 4·53 Tons per square inch.

APPLICATION OF "E MAX." SECTION TO DOUBLE LINE RAILWAY WITH CROSS SLEEPERS.



STRENGTH OF FLOOR AS SHEWN ABOVE FOR 25′ 0″ SPAN.

Live Load (wheel load 10 Tons) distributed over 2 Widths, "C" = 6ft. 0in.

Dead Load per square foot = 131·5lbs.

Total Dead Load on 2 Widths "C" $= \dfrac{25' \times 6' \times 131{\cdot}5}{2240} = 8{\cdot}8$ Tons.

Bending Moment due to Live Load $= (20 \times 9{\cdot}38 - 10 \times 5)\ 12'' = 1651{\cdot}2$ inch tons

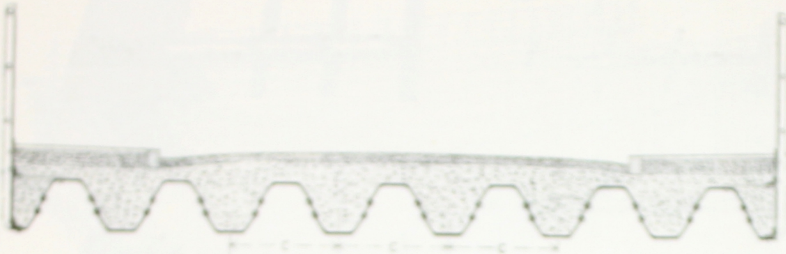
Bending Moment due to Dead Load $= \dfrac{8{\cdot}8 \times 25 \times 12}{8} = 330{\cdot}0$,, ,,

Total $1981{\cdot}2$,, ,,

Modulus of 2 Widths "C" $= 2 \times 203{\cdot}87 = 407{\cdot}74$.

Stress $= \dfrac{1981{\cdot}2}{407{\cdot}74} = 4{\cdot}85$ Tons per square inch.

APPLICATION OF "E MAX." SECTION TO PUBLIC ROAD BRIDGE.



STRENGTH OF FLOOR AS SHEWN ABOVE FOR 35' 0" SPAN.

Live Load—Traction Engine 15 Tons, and Loaded Wagon of 32 Tons, distributed over 3 Widths "C" = 9ft. 0in.

Dead Load per square foot = 217lbs.

Total Dead Load = $\frac{35' \times 9' \times 217}{2240}$ = 30·52 Tons.

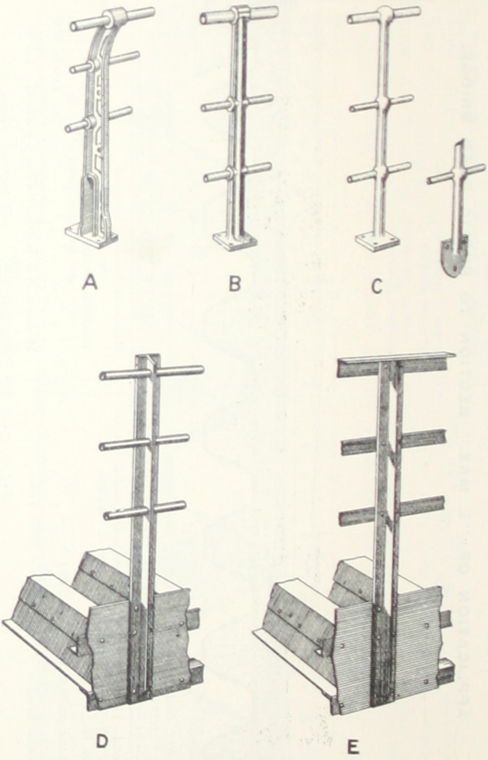
Maximum Bending Moment due to Live Load = 2208 inch tons

Maximum Bending Moment due to Dead Load = $\frac{30·52 \times 35 \times 12}{8}$ = 1602 " "

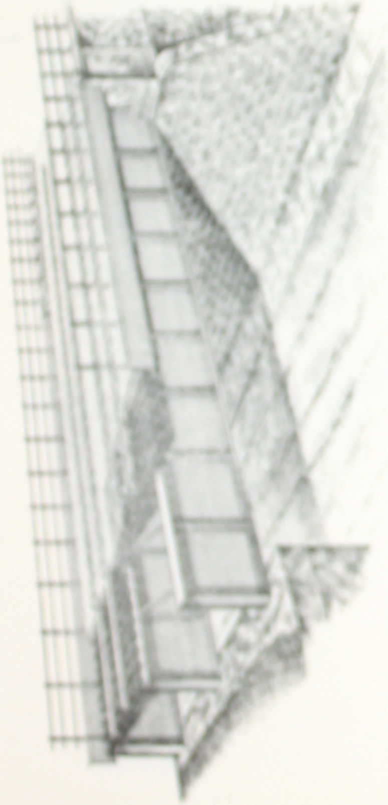
Total 3809 " "

Modulus of 3 Widths "C" = 3 × 203·97 = 611·91.

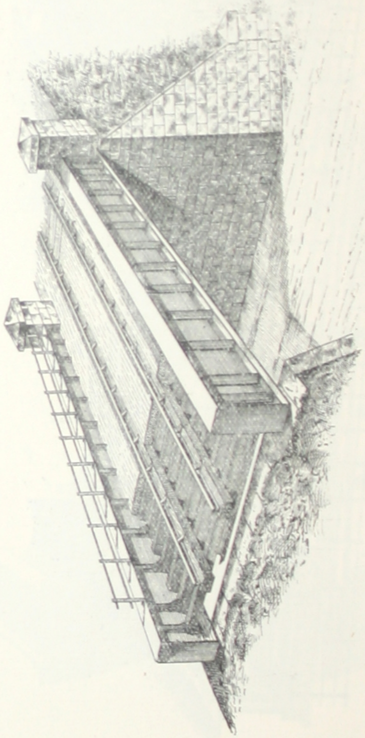
Stress = $\frac{3809}{611·91}$ = 6·22 tons per square inch.



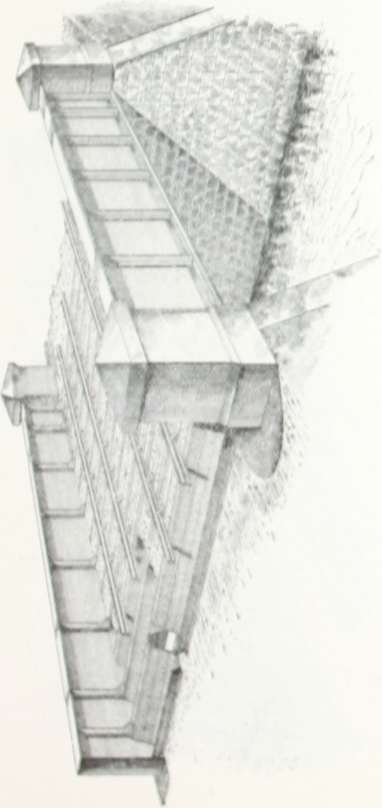
TYPES OF HAND RAILING.



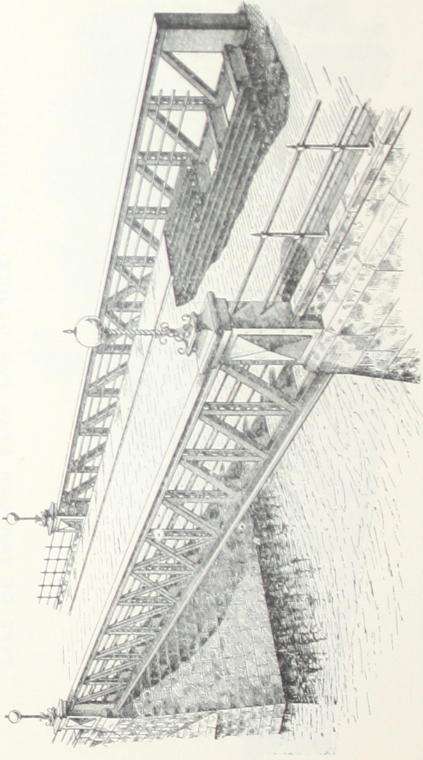
TYPE OF DECK SPAN FOR DOUBLE LINE RAILWAY



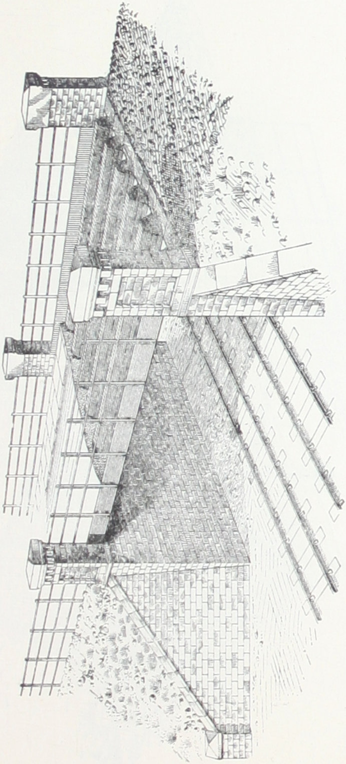
TYPE OF THROUGH SPAN FOR SINGLE LINE RAILWAY.



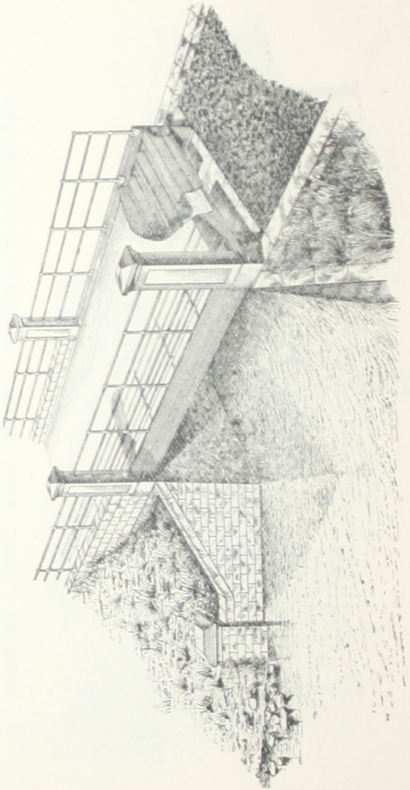
TYPE OF THROUGH SPAN FOR DOUBLE LINE RAILWAY.



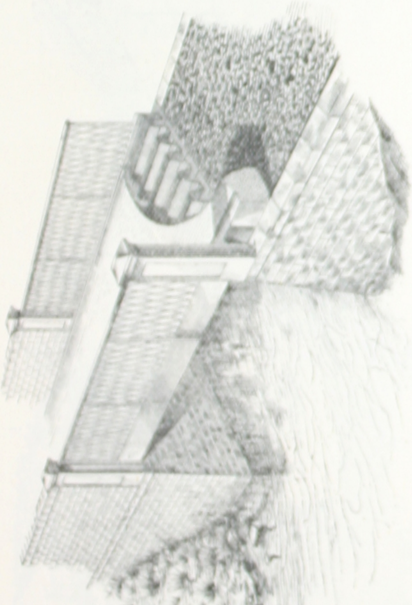
TYPE OF PUBLIC ROAD BRIDGE OF LARGE SPAN.



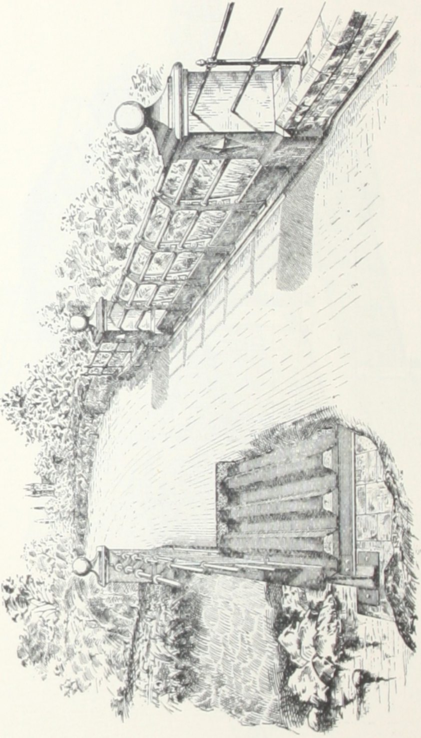
TYPE OF PUBLIC ROAD BRIDGE WITHOUT MAIN GIRDERS.



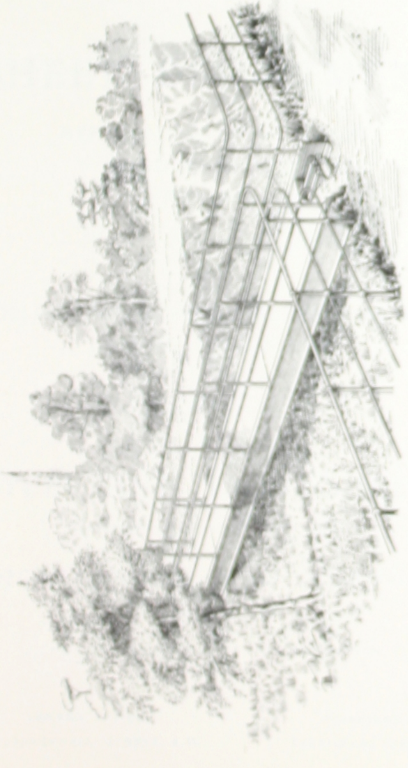
TYPE OF HIGHWAY BRIDGE.



TYPE OF HIGHWAY BRIDGE.



TYPE OF LIGHT CARRIAGE BRIDGE.



TYPE OF FOOT BRIDGE.

BRANDS.

R

P D

·LYRE BIRD·

·BRAND·

DL

DIAMOND

APPROXIMATE NUMBER OF GALVANIZED CORRUGATED SHEETS PER TON.

Size	Corrugation	5'	5½'	6'	6½'	7'	7½'
16 B.G.	8/3" & 5/5"	70	64	58	54	50	47
"	10/3" & 6/5"	59	54	49	45	42	39
18 B.G.	5/5"						
"	8/3"	86	78	72	66	62	57
"	6/4"						
"	7/4"	76	70	64	59	54	51
"	6/5"						
"	10/3"	74	67	62	56	53	50
20 B.G.	8/3"						
"	6/4"	114	104	95	88	81	76
"	7/4"	97	89	81	75	70	65
"	10/3"	95	86	79	73	68	64
22 B.G.	8/3"	139	127	116	107	99	93
"	10/3"	116	106	97	90	83	78
24 B.G.	8/3"	168	153	140	130	120	112
"	9/3"	154	140	128	119	110	103
"	10/3"	140	128	117	108	100	94
26 B.G.	8/3"	223	203	186	172	159	149
"	9/3"	204	186	170	157	146	136
"	10/3"	186	169	155	143	133	124
28 B.G.	8/3"	240	219	200	185	172	161
"	9/3"	220	200	183	169	158	147
"	10/3"	200	182	167	154	143	133

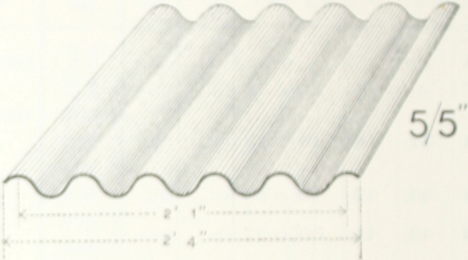
Flat Sheets 30" wide count the same as 8/3" corrugation, and 36" wide same as 10/3" corrugation.

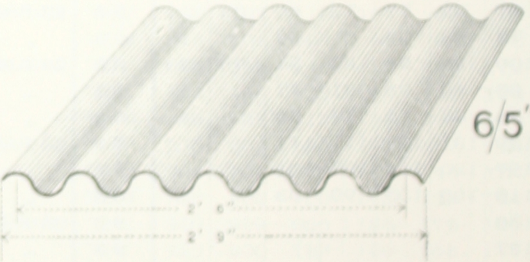
APPROXIMATE NUMBER OF GALVANIZED CORRUGATED SHEETS PER TON.

8′	8½′	9′	9½′	10′	11′	12′	Corrugation	Size
44	...	...	...	...	...	...	8/3″ 5/5″	16 B. G.
37	...	...	...	...	...	...	10/3″ 6/5″	,,
54	51	48	45	43	...	...	5/5″	18 B. G.
							8/3″	,,
							6/4″	,,
48	45	42	40	38	...	...	7/4″	,,
46	43	41	39	37	...	...	6/5″	,,
							10/3″	,,
71	67	63	60	57	...	...	8/3″	20 B. G.
							6/4″	,,
61	57	54	51	49	...	...	7/4″	,,
59	56	53	50	47	...	...	10/3″	,,
87	82	77	73	69	63	...	8/3″	22 B. G.
73	68	65	61	58	...	...	10/3″	,,
100	98	93	88	84	76	70	8/3″	24 B. G.
96	90	85	81	77	...	...	9/3″	,,
88	83	78	74	70	...	...	10/3″	,,
139	131	124	117	111	...	...	8/3″	26 B. G.
127	120	113	107	101	...	...	9/3″	,,
116	109	103	98	93	...	...	10/3″	,,
150	...	...	...	...	...	...	8/3″	28 B. G.
137	...	...	...	...	...	...	9/3″	,,
125	...	...	...	...	...	...	10/3″	,,

Flat Sheets 30″ wide count the same as 8/3″ corrugation, and 36″ wide same as 10/3″ corrugation.

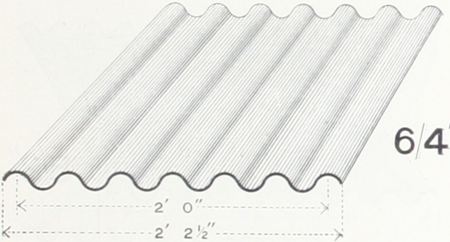
CORRUGATED SHEETS.



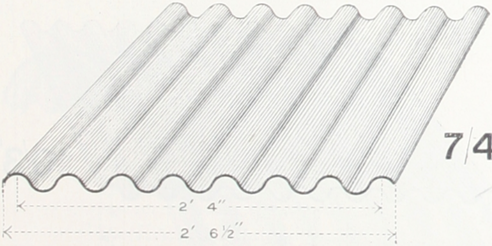


GAUGES 16, 18 AND 20 B.G.

CORRUGATED SHEETS.



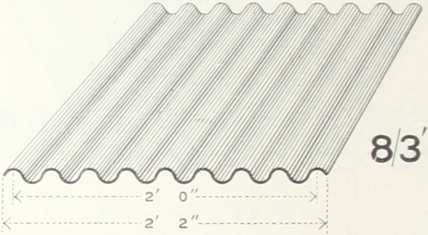
6/4″



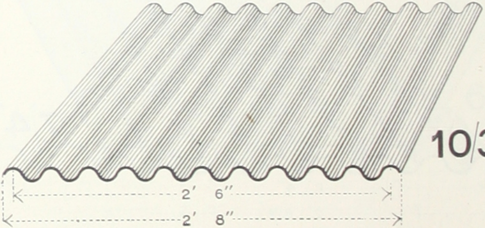
7/4″

GAUGES 16. 18 AND 20 B.G.

CORRUGATED SHEETS.



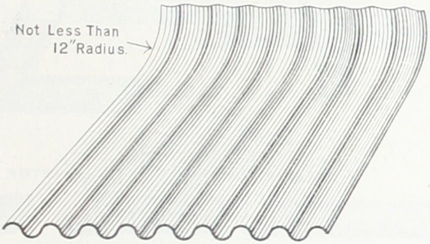
8/3″



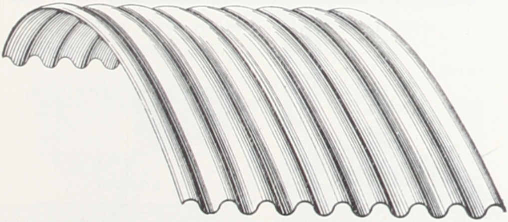
10/3″

GAUGES 16, 18, 20, 22, 24, 26 AND 28 B.G.

CURVED CORRUGATED SHEETS.



8/3″ OR 10/3″.	FROM 16 TO 26 GAUGE.	
5/5″ ,, 6/5″.	,, 16 ,, 20 ,,	

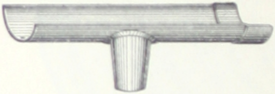


8/3″ OR 10/3″.	FROM 16 TO 26 GAUGE.
5/5″ ,, 6/5″.	,, 16 ,, 20 ,,

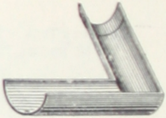
GALVANIZED GUTTERS AND DOWN PIPES.

GAUGE 16 TO 26.

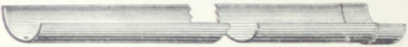
SOCKET.



ANGLE.



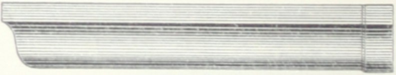
HALF ROUND.



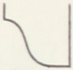
STOP END.

GIRTH 10″ TO 36″. LENGTH ABOUT 6′ 0″.

O G GUTTER.

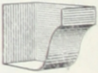


SECTION.

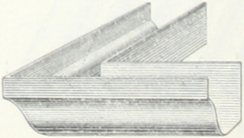


GIRTH 10″ TO 36″. LENGTH ABOUT 6′ 0″.

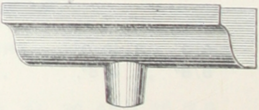
STOP END.



ANGLE.

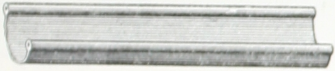


SOCKET.



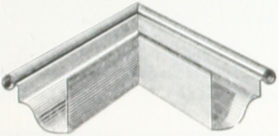
GALVANIZED GUTTERS AND DOWN PIPES.

BEADED GUTTER.

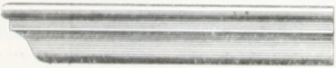


GIRTH 10" TO 36". GAUGE 24. LENGTH ABOUT 6' 0".

MOULDED O G ANGLE.

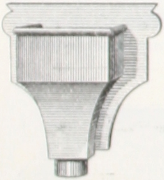


STAMPED O G GUTTER, WITH SLIP JOINTS. SECTION.

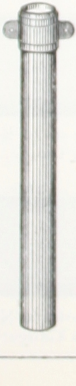


GIRTH 10" TO 36". GAUGE 24. LENGTH ABOUT 6' 0".

FOUNTAIN HEAD.



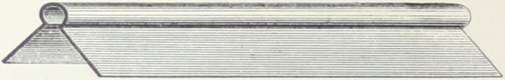
DOWN PIPE.



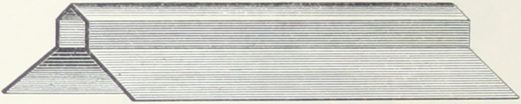
DIAMETER 3" TO 12". GAUGE 20 TO 26.
LENGTH ABOUT 6' 0".
16 & 18 GAUGE IN SHORTER LENGTHS.

SHOE.

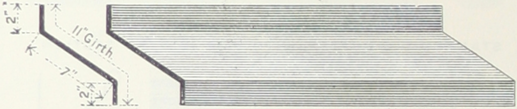
GALVANIZED RIDGES AND LOUVRE BLADES.



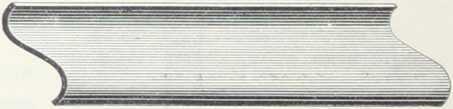
Girth 12″ to 36″. Gauge 16 to 26. Length about 6′ 0″.



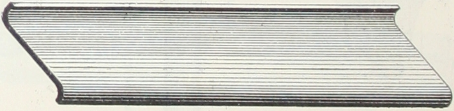
Girth 12″ to 36″. Gauge 16 to 26. Length about 6′ 0″.



16 Gauge up to ⅛″ thick, maximum length 6′ 0″.
Under 16 Gauge, ,, ,, 8′ 0″.

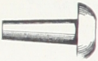


Girth 11″.—16 Gauge up to ⅛″ thick, maximum length 6′ 0″.
Under 16 Gauge, ,, ,, 8′ 0″.



Girth 11″.—16 Gauge up to ⅛″ thick, maximum length 6′ 0″.
Under 16 Gauge, ,, ,, 8′ 0″.

GALVANIZED FITTINGS.



Weight of Rivets.

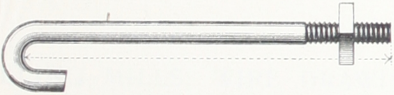
3/8″ × 1/4″	- 57	Gross to 1 cwt.
1/2″ × 1/4″	- 52	,, ,,
5/8″ × 1/4″	- 48	,, ,,

Weight of Bolts and Nuts.

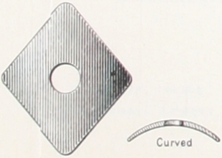
1 1/4″ × 1/4″	- 24	Gross to 1 cwt.
1 1/2″ × 1/4″	- 22	,, ,,
3/4″ × 1/4″	- 31	,, ,,
1/2″ × 1/4″	- 32	,, ,,

2 1/2″	- 22	Gross to 1 cwt.
3″	- 19	,, ,,

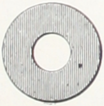
2 1/4″	- 24	Gross to 1 cwt.
2 1/2″	- 21	,, ,,
3″	- 16	,, ,,



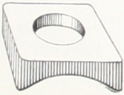
4″	× 5/16″	diameter	- 5 1/2	Gross to 1 cwt.
4 1/2″	× 5/16″	,,	- 5	,, ,,
5″	× 5/16″	,,	- 4 1/2	,, ,,
4″	× 3/8″	,,	- 4	,, ,,
4 1/2″	× 3/8″	,,	- 3 1/2	,, ,,
5″	× 3/8″	,,	- 3	,, ,,



18 Gross to 1 cwt.



For 1/4″ Rivets and Nails:
57 Gross to 1 cwt.



11 Gross to 1 cwt.

THE CLEVELAND WIRE MILLS.

SPECIALITIES:

Galvanized Telegraph (High Conductivity) Wire.

Galvanized Telephone Wire.

Signal Strand, etc.

Galvanized Patent Steel Hawser Wire to Lloyd's Specification.

Bright Patent and Plough Steel Rope Wire of all grades and of Highest Tensile Strength and Ductility.

DRAWN AND ANNEALED PIT GUIDE RODS, WELDS GUARANTEED.

The Cleveland Wire Mills are also makers of all kinds of

IRON, STEEL & CHARCOAL WIRE OF ALL SIZES & GRADES FOR ALL PURPOSES.

DORMAN, LONG & CO. LIMITED.

GALVANIZED STEEL BARB FENCING WIRE.

Style	Description	Weight of 100 yds.	Weight of Mile	Length of 112lbs. or 51 Kilos
		lbs.	lbs.	
	2 Point Ordinary Barbs round One Wire only, 5in. apart	19	335	589 yards 539 metres
	2 Point Thickset Barbs round One Wire only, 2½in. apart	21	370	533 yards 487 metres
	4 Point Ordinary Barbs round One Wire only, 6in. apart	20	352	560 yards 512 metres
	4 Point Thickset Barbs round One Wire only, 3in. apart	25	440	448 yards 410 metres
	4 Point Ordinary Barbs round Both Wires, 6in. apart	20	352	560 yards 512 metres
	4 Point Thickset Barbs round Both Wires, 3in. apart	25	440	448 yards 410 metres

GALVANIZED FENCING STRAND.

THREE PLY.				FIVE PLY.			
Gauge	Size of Single Wire	Weight per Mile, Lbs.	Length per Cwt., Yards	Gauge	Size of Single Wire	Weight per Mile, Lbs.	Length per Cwt., Yards
0	8	1100	179	0	10½	1070	184
1	8½	994	198	1	11½	870	226
2	9	800	246	2	12	778	253
3	10	704	280	3	13	607	324
4	11	580	340	4	13½	530	372
5	12	466	423	5	14	460	428
6	12½	414	476	6	15	372	530
7	13¼	340	580	7	16	294	670
8	14	275	717	8	16½	250	788
9	15	223	884	9	17	225	876
10	16	176	1120	10	18	165	1194

FOUR PLY.				SEVEN PLY.			
Gauge	Size of Single Wire	Weight per Mile, Lbs.	Length per Cwt., Yards	Gauge	Size of Single Wire	Weight per Mile, Lbs.	Length per Cwt., Yards
0	9½	1063	185	½	7½	2840	69
1	10½	855	231	$\frac{7}{16}$	9	2085	95
2	11	773	255	0	11½	1211	162
3	12	620	318	$\frac{5}{16}$	12	1085	182
4	12½	552	356	1	12½	963	205
5	13¼	454	434	2	13	850	232
6	14	367	537	3	13½	741	266
7	14½	330	593	4	14¼	610	323
8	15½	265	743	5	15	520	379
9	16¼	220	896	6	16	410	481
10	17	180	1095	7	16½	351	560
				8	17¼	292	675
				9	18	230	853
				10	18½	195	1011

DORMAN, LONG & CO. LIMITED.

IMPERIAL STANDARD WIRE GAUGE.

TABLE OF SIZES, WEIGHTS, LENGTHS, AND BREAKING STRAINS OF STEEL WIRE

As adopted by the Iron and Steel Wire Manufacturers' Association—January, 1904.

Diameter Inches	Size on Wire Gauge	Diameter		Sectional area in square inches	Approximate weight of			Approximate length of		Approximate breaking strain	
		Decl. of an inch	Millimetres		100 Yards	Mile	Kilometre	Cwt.	100 Kilos	25 Tons per sq. in.	35 Tons per sq. in.
					lbs.	lbs.	lbs.	yards	yards	lbs.	lbs.
½	7/0	·500	12·7	·19635	200·11	3522	2188	56	110	10995	15393
15/32	6/0	·464	11·8	·16910	172·33	3033	1885	65	128	9469	13257
7/16	5/0	·432	11·0	·14657	149·37	2629	1634	75	147	8208	11490
13/32	4/0	·400	10·2	·12568	128·07	2254	1400	87·5	172	7035	9851
⅜	3/0	·372	9·4	·10869	110·80	1950	1211	101	198	6086	8521
11/32	2/0	·348	8·8	·09510	96·93	1706	1060	115	226	5326	7457
..	1/0	·324	8·2	·08244	84·03	1479	919	133	261	4616	6463
..	1	·300	7·6	·07069	72·04	1268	788	155	305	3958	5542
..	2	·276	7·0	·05982	60·97	1073	667	183	360	3350	4690
¼	3	·252	6·4	·04987	50·85	895	556	220	433	2792	3910
..	4	·232	5·9	·04227	43·07	758	471	260	512	2366	3313
..	5	·212	5·4	·03530	35·97	633	393	311	612	1977	2767
3/16	6	·192	4·9	·02896	29·43	518	323	380	748	1621	2269
..	7	·176	4·5	·02432	24·77	436	271	452	890	1362	1908
..	8	·160	4·1	·02011	20·45	360	224	546	1075	1125	1576
..	9	·144	3·7	·01628	16·59	292	182	675	1329	911	1276
⅛	10	·128	3·3	·01287	13·12	231	143	854	1681	720	1008
..	11	·116	3·0	·01057	10·80	190	118	1040	2047	592	828
..	12	·104	2·6	·00850	8·63	152	95	1293	2545	475	666
3/32	13	·092	2·3	·00665	6·76	119	74	1653	3254	373	521
..	14	·080	2·0	·00503	5·11	90	56	2186	4303	281	394
..	15	·072	1·8	·00407	4·15	73	45	2699	5313	227	318
1/16	16	·064	1·6	·00322	3·29	58	36	3416	6724	180	252
..	17	·056	1·4	·00246	2·50	44	27·5	4462	8783	138	192
3/64	18	·048	1·2	·00181	1·83	32·5	20·2	6073	11954	101	141
..	19	·040	1·0	·00126	1·27	22·54	14·0	8745	17214	70	98
..	20	·036	0·9	·00102	1·03	18·25	11·34	10796	21251	57	79
1/32	21	·032	0·8	·00080	·819	14·42	8·96	13663	26894	45	63
..	22	·028	0·7	·00062	·628	11·04	6·86	17846	35128	34·4	48·2
..	23	·024	0·6	·00045	·461	8·11	5·04	24290	47813	25·2	35·3
3/128	24	·022	0·55	·00038	·387	6·82	4·24	28908	56903	21·2	29·8
..	25	·020	0·5	·00031	·320	5·63	3·5	34978	68851	17·6	24·6
..	26	·018	0·45	·00025	·259	4·56	2·84	43184	85003	14·2	19·9
..	27	·0164	0·4	·00021	·215	3·79	2·35	52021	102498	11·8	16·6
1/64	28	·0148	0·37	·00017	·175	3·09	1·92	63877	125735	9·6	13·5
..	29	·0136	0·35	·00014	·148	2·61	1·62	75646	148903	8·1	11·4
..	30	·0124	0·32	·00012	·123	2·17	1·35	90996	179118	6·8	9·5

DORMAN, LONG & CO. LIMITED.

TABLE OF TENSILE STRAIN OF WIRE.

From ·3 to ·126 Inch for 1 Ton per Square Inch for each One Thousandth Part of an Inch.

TENSILE OF WIRE IN LBS. FOR 1 TON (2240 LBS.) PER EACH $\frac{1}{1000}$ INCH.

Decl.	Lbs.	Decl.	Lbs.	Decl.	Lbs.	Decl.	Lbs.	Decl.	Lbs.
·3	158·3	·265	123·6	·23	93·1	·195	67·	·16	45·
·299	157·3	·264	122·6	·229	92·3	·194	66·2	·159	44·5
·298	156·2	·263	121·7	·228	91·5	·193	65·6	·158	43·9
·297	155·2	·262	120·8	·227	90·7	·192	64·8	·157	43·4
·296	154·2	·261	119·8	·226	89·9	·191	64·2	·156	42·8
·295	153·1	·26	118·9	·225	89·01	·19	63·6	·155	42·3
·294	152·1	·259	118·	·224	88·2	·189	62·9	·154	41·7
·293	151·	·258	117·1	·223	87·51	·188	62·2	·153	41·2
·292	150·	·257	116·2	·222	86·7	·187	61·5	·152	40·6
·291	149·	·256	115·3	·221	85·9	·186	60·9	·151	40·1
·29	147·9	·255	114·4	·22	85·1	·185	60·2	·15	39·6
·289	146·9	·254	113·5	·219	84·3	·184	59·5	·149	39·
·288	145·9	·253	112·6	·218	83·6	·183	59·	·148	38·5
·287	144·9	·252	111·7	·217	82·84	·182	58·3	·147	38·
·286	143·9	·251	110·8	·216	82·1	·181	57·7	·146	37·5
·285	142·9	·25	110·1	·215	81.3	·18	57·	·145	37·
·284	141·9	·249	109·1	·214	80·6	·179	56·4	·144	36·5
·283	140·9	·248	108·2	·213	79·8	·178	55·7	·143	36·
·282	139·9	·247	107·3	·212	79·	·177	55·2	·142	35·5
·281	138·9	·246	106·4	·211	78·3	·176	54·5	·141	35·
·28	137·9	·245	105·6	·21	77·6	·175	53·8	·14	34·5
·279	136·9	·244	104·7	·209	76·9	·174	53·3	·139	34·
·278	135·9	·243	103·9	·208	76·2	·173	52·7	·138	33·5
·277	135·	·242	103·	·207	75·4	·172	52·	·137	33·
·276	134·1	·241	102·	·206	74·7	·171	51·5	·136	32·5
·275	133·	·24	101·1	·205	73·9	·17	50·9	·135	32·
·274	132·1	·239	100·51	·204	73.2	·169	50·2	·134	31·6
·273	131·1	·238	99·71	·203	72·5	·168	49·6	·133	31·1
·272	130·2	·237	98·8	·202	71·8	·167	49·	·132	30·7
·271	129·2	·236	98·	·201	71·	·166	48·5	·131	30·2
·27	128·2	·235	97·	·2	70·4	·165	47·9	·13	29·7
·269	127·3	·234	96·3	·199	69·7	·164	47·3	·129	29·3
·268	126·3	·233	95·5	·198	69·	·163	46·7	·128	28·8
·267	125·4	·232	94·7	·197	68·3	·162	46·2	·127	28·4
·266	124·4	·231	93·9	·196	67·6	·161	45·6	·126	28·

TABLE OF TENSILE STRAIN OF WIRE.

From ·125 to ·001 Inch for 1 Ton per Square Inch for each One Thousandth Part of an Inch.

TENSILE OF WIRE IN LBS. FOR 1 TON (2,240 LBS.) PER EACH $\frac{1}{1000}$ INCH.

Decl.	Lbs.	Decl.	Lbs.	Decl.	Lbs.	Decl.	Lbs.	Decl.	Lbs.
·125	27·5	·1	17·6	·075	9·9	·05	4·4	·025	1·1
·124	27·	·099	17·24	·074	9·6	·049	4·2	·024	1·014
·123	26·6	·098	16·9	·073	9·4	·048	4·0	·023	·93
·122	26·2	·097	16·6	·072	9·1	·047	3·8	·022	·85
·121	25·8	·096	16·2	·071	8·9	·046	3·7	·021	·775
·12	25·3	·095	15·9	·07	8·6	·045	3·55	·02	·7
·119	24·9	·094	15·55	·069	8.4	·044	3·4	·019	·635
·118	24·5	·093	15·2	·068	8·1	·043	3·25	·018	·57
·117	24·1	·092	14·9	·067	7·9	·042	3·12	·017	·508
·116	23·7	·091	14·6	·066	7·7	·041	2·95	·016	·45
·115	23·3	·09	14·3	·065	7·4	·04	2·8	·015	·396
·114	22·9	·089	13·9	·064	7·2	·039	2·7	·014	·3448
·113	22·5	·088	13·6	·063	7·	·038	2·56	·013	·297
·112	22·1	·087	13·3	·062	6·8	·037	2·4	·012	·253
·111	21·7	·086	13·	·061	6·5	·036	2·3	·011	·2128
·11	21·3	·085	12·7	·06	6·33	·035	2·16	·01	·176
·109	20·9	·084	12·4	·059	6·1	·034	2·04	·009	·1425
·108	20·5	·083	12·1	·058	5·9	·033	1·93	·008	·1126
·107	20·1	·082	11·8	·057	5·7	·032	1·8	·007	·0862
·106	19·7	·081	11·5	·056	5·5	·031	1·7	·006	·0633
·105	19·4	·08	11·26	·055	5·3	·03	1·58	·005	·04398
·104	19·	·079	11·	·054	5·1	·029	1·48	·004	·02815
·103	18·7	·078	10·7	·053	4·9	·028	1·38	·003	·01583
·102	18·3	·077	10·4	·052	4·8	·027	1·28	·002	·007
·101	17·9	·076	10·16	·051	4·6	·026	1·188	·001	·00176

NOTE.—To explain the application of the above table, the following illustration will suffice:—

Required to know the breaking strain of any wire the section of which is comprised within the limits of ·3 and ·001 diameter of section of wire. Find the breaking strain by usual test. Let it be supposed ·084. If the wire breaks at 620lbs. strain, find in the table, opposite ·084, the figures in the column headed "lbs." 12·4. Use these as a diviser: 620 ÷ 12·4 = 50 tons.

DORMAN, LONG & CO. LIMITED.

OPEN HEARTH STEEL

Manufactured and Rolled at Clarence Steelworks.

INGOTS

Description	Size	Weight
	Inches	Cwts.
Octagon Fluted	26½ × 24½	100/110
" "	27 × 23½	100/115
" "	24½ × 20½	100/110
" "	22 × 18½	75/85
" "	20 × 17	55/65
Hexagon	22 × 20	60/65
Rectangular	24 × 20	60/65
"	21 × 17	35/46
"	16½ × 14½	28/30
Square	18	35/42
"	17	30/36
"	16	29/32
"	14½	25
"	12	17
Slab	33 × 11½	40/60

All Measurements taken across the Flats.

DORMAN, LONG & CO. LIMITED.

OPEN HEARTH STEEL

Manufactured and Rolled at Clarence Steelworks.

BLOOMS

Inches	Inches	Inches	Inches
10 × 8	8 × 7	7 × 6	6 × 5
8 × 8½	7 × 7	6 × 6	

BILLETS

Inches	Inches	Inches	Inches
5½ × 5½	4 × 4	3 × 3	2¼ × 2¼
5 × 5	3½ × 3½	2¾ × 2¾	2 × 2
4½ × 4½	3¼ × 3¼	2½ × 2½	1 15/16 × 1 15/16

SLABS

Inches	Inches	Inches	Inches
7 × 4¾	7 × 2½	7 × 1½	6 × 3½
7 × 3½	7 × 2	6 × 4¾	6 × 3
			6 × 2

FLATS

Inches	Inches	Inches	Inches	Inches	Inches	Inches
7 × 1⅜	7 × ⅞	6 × 2	6 × 1½	6 × 1	5 × 2	4 × 2
7 × 1¼	7 × ¾	6 × 1⅞	6 × 1⅜	6 × ⅞	5 × 1¾	4 × 1¾
7 × 1⅛	7 × ⅝	6 × 1¾	6 × 1¼	6 × ¾	5 × 1½	4 × 1½
7 × 1		6 × 1⅝	6 × 1⅛	6 × ⅝	5 × 1¼	4 × 1¼

TINPLATE BARS, TAPER EDGES

Inches	Inches	Inches	Inches
7½ × 1	7½ × 13/16	7½ × ⅝	7½ × 15/32
7½ × 15/16	7½ × ¾	7½ × 9/16	7½ × 7/16
7½ × ⅞	7½ × 11/16	7½ × ½	

GENERAL INFORMATION, FORMULÆ, TABLES, ETC.

GENERAL FORMULAE FOR THE FLEXURE OF BEAMS.

A = area of section in square inches
L = length of span in feet
l = length of span in inches
W = total distributed load in tons
f = safe stress, in tons per square inch, in extreme fibres of beam
d = total depth of cross section in inches
y = distance in inches of outermost fibre from neutral axis $\left(\text{in a symmetrical section } y = \frac{d}{2}\right)$
M = maximum bending moment in inch tons
D = maximum deflection in inches
I = greatest moment of Inertia about the neutral axis (passing through the centre of gravity of section)
Ip = moment of Inertia about an axis parallel to above, but not passing through the centre of gravity
v = distance in inches between these axes
Z = section modulus
r = radius of gyration in inches
E = modulus of elasticity (assumed at 12,000 tons per square inch for steel)

$$Z = \frac{I}{y} \qquad Ip = I + A.v^2 \qquad r = \sqrt{\frac{I}{A}}$$

$$M = \frac{f.I}{y} = fZ \qquad f = \frac{M.y}{I} = \frac{M}{Z}$$

For a beam supported at both ends and uniformly loaded, $W = \frac{8 \times f \times Z}{l} = \frac{8 \times f \times I}{l \times y}$

(I) $D = \frac{5\ W.l^3}{384\ E.I}$ for beams of uniform section, supported at both ends and uniformly loaded

(II) $D = \frac{P.l^3}{48\ E.I}$ for beams of uniform section, supported at both ends and loaded with a single load, P, at centre of span

(III) $D = \frac{W.l^3}{8\ E.I}$ for beams of uniform section fixed at one end and supported at the other, and uniformly loaded

(IV) $D = \frac{P.l^3}{3\ E.I}$ for beams of uniform section fixed at one end and unsupported at the other, and loaded with a single load, P, at the latter end

For girders with equal flanges and f taken at 7½ tons per square inch, the deflection is as follows:—

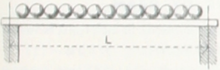
(I) $D = \frac{\cdot01875\ L^2}{d}$; (II) $D = \frac{\cdot015\ L^2}{d}$; (III) $D = \frac{\cdot045\ L^2}{d}$; (IV) $D = \frac{\cdot06\ L^2}{d}$

BENDING MOMENT, SHEAR AND DEFLECTION OF BEAMS UNDER VARIOUS SYSTEMS OF LOADING.

W = total load in tons.
I = moment of inertia.
E = modulus of elasticity, assumed at 12,000 tons per square inch for steel.
d = depth of beam in inches.

L = span in feet.
l = span in inches.
A = distance in feet.
a = same distance in inches.
B = distance in feet.
b = same distance in inches.

(1).—BEAM SUPPORTED AT BOTH ENDS AND HAVING AN UNIFORMLY DISTRIBUTED LOAD.



Safe load = that given in the tables.

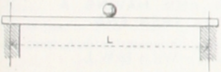
Maximum bending moment, in inch tons, at middle of span $= \frac{W.l}{8} = \frac{3\ W.L}{2}$.

Maximum shear at points of support $= \frac{W}{2}$.

Maximum deflection in inches $= \frac{5\ W.l^3}{384\ E.I}$.

Maximum deflection in inches, where flanges are equal and extreme fibre stress taken at 7½ tons per square inch $= \frac{\cdot 01875\ L^2}{d}$.

(2).—BEAM SUPPORTED AT BOTH ENDS AND HAVING A CONCENTRATED LOAD IN THE MIDDLE.



Safe load = half that given in the tables for case (1).

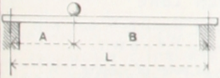
Maximum bending moment, in inch tons, at middle of span $= \frac{W.l}{4} = 3\ W.L.$

Maximum shear between load and point of support $= \frac{W}{2}$.

Maximum deflection in inches $= \frac{W.l^3}{48\ E.I}$.

Maximum deflection in inches, where flanges are equal and extreme fibre stress taken at 7½ tons per square inch $= \frac{\cdot 015\ L^2}{d}$.

(3).—BEAM SUPPORTED AT BOTH ENDS AND HAVING A CONCENTRATED LOAD AT ANY POINT.



Safe load = that given in the tables for case (1) $\times \frac{L^2}{8\ A.B}$.

Maximum bending moment, in inch tons, at point of application of load $= \frac{W.a.b}{l} = \frac{12\ W.A.B}{L}$.

Maximum shear between load and the nearer support $= \frac{W.B}{L}$ and between load and the other support $= \frac{W.A}{L}$.

Maximum deflection, in inches $= \frac{W.a.b(2l-a)}{9\ E.I\ l} \sqrt{\frac{a}{3}(2l-a)}$.

Maximum deflection, in inches, where flanges are equal and extreme fibre stress taken at 7½ tons per square inch $= \frac{2\ L - A}{609\ d} \sqrt{48\ A\ (2\ L - A)}$.

Note.—Care should be taken that the maximum shear, in the above cases, does not exceed half the maximum load given in the tables.

DORMAN, LONG & CO. LIMITED.

BENDING MOMENT, SHEAR AND DEFLECTION OF BEAMS UNDER VARIOUS SYSTEMS OF LOADING.

W = total load in tons.
I = moment of inertia.
E = modulus of elasticity, assumed at 12,000 tons per square inch for steel.
d = depth of beam in inches.

L = span in feet.
l = span in inches.
A = distance in feet.
a = same distance in inches.
B = distance in feet.
b = same distance in inches.

(4).—BEAM SUPPORTED AT BOTH ENDS AND HAVING TWO EQUAL LOADS, $\frac{W}{2}$, CONCENTRATED AT EQUAL DISTANCES FROM CENTRE OF BEAM.

Safe load = that given in the tables for case (1) $\times \frac{L}{4A}$.

Maximum bending moment, in inch tons, between loads $= \frac{W.a}{2} = 6$ W.A.

Maximum shear between load and nearer support $= \frac{W}{2}$.

Maximum deflection, in inches $= \frac{W.a}{48\,E.I}(3l^2 - 4a^2)$.

Maximum deflection, in inches, where flanges are equal and extreme fibre stress taken at 7½ tons per square inch $= \frac{\cdot 0075}{d}(3\,L^2 - 4\,A^2)$.

(5).—BEAM FIXED AT ONE END AND HAVING A CONCENTRATED LOAD AT THE FREE END.

Safe load = ⅛ that given in the tables for case (1).

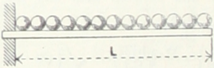
Maximum bending moment, in inch tons, at point of support = W.l = 12 W.L.

Maximum shear between load and point of support = W.

Maximum deflection, in inches $= \frac{W.l^3}{3\,E.I}$.

Maximum deflection, in inches, where flanges are equal and extreme fibre stress taken at 7½ tons per square inch $= \frac{\cdot 06\,L^2}{d}$.

(6).—BEAM FIXED AT ONE END AND HAVING AN UNIFORMLY DISTRIBUTED LOAD.



Safe load = ¼ that given in the tables for case (1).

Maximum bending moment, in inch tons, at point of support $= \frac{W.l}{2} = 6$ W.L.

Maximum shear at point of support = W.

Maximum deflection, in inches $= \frac{W.l^3}{8\,E.I}$.

Maximum deflection, in inches, where flanges are equal and extreme fibre stress taken at 7½ tons per square inch $= \frac{\cdot 045\,L^2}{d}$.

NOTE.—Care should be taken that the maximum shear, in the above cases, does not exceed half the maximum load given in the tables.

BENDING MOMENT, SHEAR, DEFLECTION &c., OF BEAMS UNDER VARIOUS SYSTEMS OF LOADING.

W = total load in tons.

I = moment of inertia.

E = modulus of elasticity, assumed at 12,000 tons per square inch for steel.

d = depth of beam in inches.

D = distance in feet.

L = span in feet.

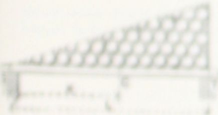
l = span in inches.

y = length in feet over which load is distributed.

C = point at which maximum bending moment occurs.

x = distance in feet of C from support S.

(7).—BEAM SUPPORTED AT BOTH ENDS AND HAVING A DISTRIBUTED LOAD INCREASING, BY A UNIFORM INCREMENT, FROM ONE SUPPORT TO THE OTHER.



Safe load = ·9766 × that given in the tables for case (1).

x = ·5773 L.

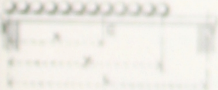
Maximum bending moment, in inch tons, at point C = ·1283 W l = 1·5396 W L.

Maximum shear at support T = $\frac{2}{3}$ W.

Maximum deflection, in inches = $\frac{19.3\ W\ L^3}{E\ I}$.

Maximum deflection, in inches, where flanges are equal and extreme fibre stress taken at $7\frac{1}{2}$ tons per square inch = $\frac{.01028\ L^2}{d}$.

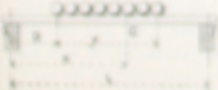
(8).—BEAM SUPPORTED AT BOTH ENDS AND HAVING A LOAD UNIFORMLY DISTRIBUTED OVER A PORTION OF ITS LENGTH, EXTENDING FROM ONE SUPPORT.



Formula for finding the position of the point C, at which the maximum bending moment occurs.

$$x = y\left(1 - \frac{y}{2L}\right).$$

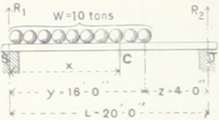
(9).—BEAM SUPPORTED AT BOTH ENDS AND HAVING A LOAD UNIFORMLY DISTRIBUTED OVER A PORTION OF ITS LENGTH, NOT EXTENDING TO EITHER SUPPORT.



Formula for finding the position of the point C, at which the maximum bending moment occurs.

$$x = D + y\left(1 - \frac{2D + y}{2L}\right).$$

BEAMS UNSYMMETRICALLY LOADED.



Example shewing how to find the size of a beam necessary to carry a load uniformly distributed over a portion of its length, and extending from one support, as shewn in diagram; the beam being supported at both ends and of uniform section throughout.

Assume that W is 10 tons, span 20′ 0″ and distance that load extends from one support is 16′ 0″.

Let R_1 = reaction at end, S, where load commences.

R_2 = reaction at other end, T.

C = point where maximum bending moment occurs.

x = distance in feet of C from end S.

P = distributed load on length x.

W_E = equivalent distributed load, over the whole beam, which would produce the same maximum bending moment as that caused by load W.

$$\text{Then } R_1 = \frac{W\left(\frac{y}{2} + z\right)}{L} = \frac{10\,(8+4)}{20} = 6 \text{ tons.}$$

$$R_2 = 10 - 6 = 4 \text{ tons.}$$

From formula on previous page $x = y\left(1 - \frac{y}{2L}\right) = 16\left(1 - \frac{16}{2\times 20}\right) = 9{\cdot}6$ feet.

$$P = \frac{W.x}{y} = \frac{9{\cdot}6 \times 10}{16} = 6 \text{ tons.}$$

The maximum bending moment $= (R_1 \times x) - \left(P \times \frac{x}{2}\right) = 6 \times 9{\cdot}6 - 6 \times 4{\cdot}8 = 28{\cdot}8$ ft. tons.

The maximum bending moment in ft. tons on a beam supported at both ends and having an uniformly distributed load, W_1, is $\frac{W_1.L}{8}$.

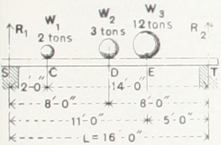
Therefore the equivalent distributed load W_E $= \dfrac{\text{Maximum bending moment in ft. tons} \times 8}{L}$.

Hence W_E in this case $= \frac{28{\cdot}8 \times 8}{20} = 11{\cdot}52$ tons.

Reference to the table of safe distributed loads on beams will shew that B.S.B 21 (12″ × 6″ × 44 lbs.) is capable of carrying 13 tons at 20 feet span; and, as half the maximum load given in the table for this beam $\left(\frac{40}{2} = 20 \text{ tons}\right)$ is greater than the maximum reaction R_1 (6 tons), this beam will meet the requirements.

BEAMS UNSYMMETRICALLY LOADED.

Example shewing how to find the size of a beam necessary to carry three loads concentrated at different points in its length, as shewn in diagram; the beam being supported at both ends, and of uniform cross section throughout.



Let W_1, W_2 and W_3 be 3 concentrated loads of 2, 3 and 12 tons respectively.

R_1 = reaction at end S.

R_2 = reaction at end T.

W_E = equivalent distributed load over the whole beam which would produce the same maximum bending moment as that caused by $(W_1+W_2+W_3)$.

Then $R_1 = \dfrac{(12 \times 5) + (3 \times 8) + (2 \times 14)}{16} = 7$ tons.

$R_2 = 12 + 3 + 2 - 7 = 10$ tons.

The maximum bending moment occurs at the point of application of one of the loads, and may be found as follows:—

The bending moment at C $= R_1 \times 2 \quad = 7 \times 2 = 14$ ft. tons.

,, ,, ,, D $= R_1 \times 8 - 2 \times 6 = 56 - 12 = 44$,, ,, .

,, ,, ,, E $= R_2 \times 5 \quad = 10 \times 5 = 50$,, ,, .

Hence the maximum bending moment is at E, and = 50 ft. tons.

The maximum bending moment, in ft. tons, on a beam supported at both ends and having an uniformly distributed load, W, is $\dfrac{W.L}{8}$.

Therefore the equivalent distributed load W_E $= \dfrac{\text{Maximum bending moment in ft. tons} \times 8}{L}$.

Hence W_E in this case $= \dfrac{50 \times 8}{16} = 25$ tons.

Reference to the table of safe distributed loads on beams will shew that B.S.B 26 (15″ × 6″ × 59 lbs.) is capable of carrying 26 tons at 16 feet span; and, as half the maximum load given in the table for this beam $\left(\dfrac{62}{2} = 31 \text{ tons}\right)$ is greater than the maximum reaction R_2 (10 tons), this beam will meet the requirements.

MENSURATION.

LENGTH.

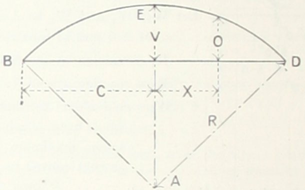
Circumference of Circle = diameter × π

Diameter of Circle = circumference × ·31831

Length of Arc = number of degress × radius × ·017453

Degrees in an Arc whose length = radius = 57°·2957795

$\pi = 3{\cdot}14159265 +$



V = versed sine C = half the chord.

R = radius O = any ordinate.

X = distance of ordinate from centre.

$$O = \sqrt{R^2 - X^2} - (R - V).$$

$$R = \frac{V^2 + C^2}{2V} \text{ or diameter } = \frac{V^2 + C^2}{V}$$

$$V = R - \sqrt{R^2 - C^2}$$

$$X = \sqrt{R^2 - (O + R - V)^2}$$

AREA.

Area of Triangle = base × half the perpendicular height.

,, Circle $= \frac{\pi D^2}{4} = \pi R^2$ where D = diameter of circle. R = radius of circle.

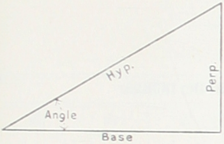
Area of Sector of Circle = Area ABED = length of arc × half the radius

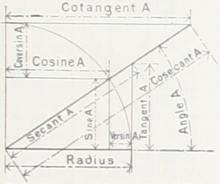
$$= \frac{\text{number of degrees in arc} \times \text{area of circle}}{360}$$

Area of Segment of Circle = Area BDE = area of Sector less area of triangle.

Area of Parabola = base × $\frac{2}{3}$ height.

TRIGONOMETRICAL FUNCTIONS.





This diagram shews the different trigonometrical functions in terms of the angle **A** to the radius of **1**.

$$\text{Sine}=\frac{\text{Perp}}{\text{Hyp.}};\quad \text{Cosine}=\frac{\text{Base}}{\text{Hyp.}};\quad \text{Tangent}=\frac{\text{Perp}}{\text{Base}};$$

$$\text{Cotangent}=\frac{\text{Base}}{\text{Perp.}};\quad \text{Secant}=\frac{\text{Hyp.}}{\text{Base}};$$

$$\text{Cosecant}=\frac{\text{Hyp.}}{\text{Perp.}};\quad \text{Versed sine}=\frac{\text{Hyp.}-\text{Base}}{\text{Hyp.}};$$

$$\text{Coversed sine}=\frac{\text{Hyp.}-\text{Perp.}}{\text{Hyp.}}$$

$$\text{Sin.}=\frac{\text{tan.}}{\text{sec.}}=\frac{1}{\text{cosec.}}=\sqrt{1-\text{cos.}^2}=\frac{\text{cos.}}{\text{cot.}}$$

$$\text{Cos.}=\frac{\text{cot.}}{\text{cosec.}}=\frac{1}{\text{sec.}}=\sqrt{1-\text{sin.}^2}=\frac{\text{sin.}}{\text{tan.}}=\text{sin.}\times\text{cot.}$$

$$\text{Tan.}=\frac{\text{sin.}}{\text{cos.}}=\frac{1}{\text{cot.}}=\text{sin.}\times\text{sec.}=\sqrt{\text{sec.}^2-1}.$$

$$\text{Cot.}=\frac{1}{\text{tan.}}=\sqrt{\text{cosec.}^2-1}=\frac{\text{cos.}}{\text{sin.}}$$

$$\text{Sec.}=\frac{1}{\text{cos.}}=\sqrt{1+\text{tan.}^2}=\frac{\text{tan.}}{\text{sin.}}$$

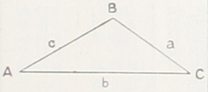
$$\text{Cosec.}=\frac{1}{\text{sin.}}=\sqrt{1+\text{cot.}^2}$$

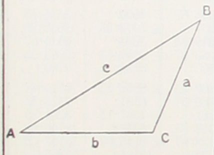
$$\text{Cos.}^2+\text{sin.}^2=1$$

$\text{Versin.} = 1-\text{cos.}$ $\quad 1+\text{tan.}^2=\text{sec.}^2$

$\text{Coversin.} = 1-\text{sin.}$ $\quad 1+\text{cot.}^2=\text{cosec.}^2$

SOLUTION OF TRIANGLES.





$$a+b+c=2s \qquad a=b.\text{cos}.\,C+c.\text{cos}.\,B$$

$$\frac{a}{\text{sin. }A}=\frac{b}{\text{sin. }B}=\frac{c}{\text{sin. }C}=\frac{abc}{2s}$$

$$\text{cos. }A=\frac{b^2+c^2-a^2}{2\,bc}\quad\text{or } a^2=b^2+c^2-2\,b.c.\text{cos. }A$$

$$\text{sin. }\frac{A}{2}=\sqrt{\frac{(s-b)(s-c)}{bc}};\quad \text{cos. }\frac{A}{2}=\sqrt{\frac{s(s-a)}{bc}};$$

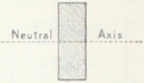
$$\text{tan. }\frac{A}{2}=\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$$

$$\text{sin. }A=\frac{2}{bc}\sqrt{s(s-a)(s-b)(s-c)}=\frac{2S}{bc}\text{ where } S=\sqrt{s(s-a)(s-b)(s-c)}$$

$$\frac{\text{tan. }\dfrac{B+C}{2}}{\text{tan. }\dfrac{B-C}{2}}=\frac{b+c}{b-c};\quad \text{tan. }\frac{B-C}{2}=\frac{b-c}{b+c}\times\text{cot. }\frac{A}{2}$$

$$\left.\begin{array}{r}\text{Area of}\\ \text{triangle}\end{array}\right\}=\frac{a.b.\text{sin}.C}{2}=\frac{b.c.\text{sin}.A}{2}=\frac{a.c.\text{sin}.B}{2}=\sqrt{s(s-a)(s-b)(s-c)}=S$$

MOMENTS OF INERTIA OF RECTANGLES.



Depth in Inches	WIDTH OF RECTANGLE IN INCHES						
	1/4	5/16	3/8	7/16	1/2	9/16	5/8
1	·021	·026	·031	·036	·042	·047	·052
2	·17	·21	·25	·29	·33	·38	·42
3	·56	·70	·84	·98	1·13	1·27	1·41
4	1·33	1·67	2·	2·33	2·67	3·	3·33
5	2·60	3·26	3·91	4·56	5·21	5·86	6·51
6	4·50	5·63	6·75	7·88	9·	10·13	11·25
7	7·15	8·93	10·72	12·51	14·29	16·08	17·86
8	10·67	13·33	16·	18·67	21·33	24·	26·67
9	15·19	18·98	22·78	26·58	30·38	34·17	37·97
10	20·83	26·04	31·25	36·46	41·67	46·87	52·08
11	27·73	34·66	41·59	48·53	55·46	62·39	69·32
12	36·	45·	54·	63·	72·	81·	90·
13	45·77	57·21	68·66	80·10	91·54	102·98	114·43
14	57·17	71·46	85·75	100·04	114·33	128·63	142·92
15	70·31	87·89	105·47	123·05	140·63	158·20	175·78
16	85·33	106·67	128·	149·33	170·67	192·	213·33
17	102·35	127·94	153·53	179·12	204·71	230·30	255·89
18	121·50	151·88	182·25	212·63	243·	273·38	303·75
19	142·90	178·62	214·34	250·07	285·79	321·52	357·24
20	166·67	208·33	250·	291·67	333·33	375·	416·67
21	192·94	241·17	289·41	337·64	385·88	434·11	482 34
22	221·83	277·29	332·75	388·21	443·67	499·13	554·58
23	253·48	316·85	380·22	443·59	506·96	570·33	633·70
24	288·	360·	432·	504·	576·	648·	720·
25	325·52	406·90	488·28	569·66	651·04	732·42	813·80
26	366·17	457·71	549·25	640·79	732·33	823·88	915·42
27	410·06	512·58	615·09	717·61	820·13	922·64	1025·16
28	457·33	571·67	686·	800·33	914·67	1029·	1143·33
29	508·10	635·13	762·16	889·18	1016·21	1143·23	1270·26
30	562·50	703·13	843·75	984·38	1125·	1265·63	1406·25
32	682·67	853·33	1024·	1194·67	1365·33	1536·	1706·67
34	818·83	1023·54	1228·25	1432·96	1637·67	1842·38	2047·08
36	972·	1215·	1458·	1701·	1944·	2187·	2430·
38	1143·17	1428·96	1714·75	2000·54	2286·33	2572·13	2857·92
40	1333·33	1666·67	2000·	2333·33	2666·67	3000·	3333·33
42	1543·50	1929·38	2315·25	2701·13	3087·	3472·88	3858·75
44	1774·67	2218·33	2662·	3105·67	3549·33	3993·	4436·67
46	2027·83	2534·79	3041·75	3548·71	4055·67	4562·63	5069·58
48	2304·	2880·	3456·	4032·	4608·	5184·	5760·
50	2604·17	3255·21	3906·25	4557·29	5208·33	5859·38	6510·42
52	2929·33	3661·67	4394·	5126·33	5858·67	6591·	7323·33
54	3280·50	4100·63	4920·75	5740·88	6561·	7381·13	8201·25
56	3658·67	4573·33	5488·	6402·67	7317·33	8232·	9146·67
58	4064·83	5081·04	6097·25	7113·46	8129·67	9145·87	10162·08
60	4500·	5625·	6750·	7875·	9000·	10125·	11250·

DORMAN, LONG & CO. LIMITED.

MOMENTS OF INERTIA OF RECTANGLES.

WIDTH OF RECTANGLE IN INCHES						Depth in Inches
$\frac{11}{16}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{7}{8}$	$\frac{15}{16}$	1	
·057	·062	·068	·073	·078	·083	1
·46	·50	·54	·58	·63	·67	2
1·55	1·69	1·83	1·97	2·11	2·25	3
3·67	4·	4·33	4·67	5·	5·33	4
7·16	7·81	8·46	9·11	9·77	10·42	5
12·38	13·50	14·63	15·75	16·88	18·	6
19·65	21·44	23·22	25·01	26·80	28·58	7
29·33	32·	34·67	37·33	40·	42·67	8
41·77	45·56	49·36	53·16	56·96	60·75	9
57·29	62·50	67·71	72·92	78·13	83·33	10
76·26	83·19	90·12	97·05	103·98	110·92	11
99·	108·	117·	126·	135·	144·	12
125·87	137·31	148·75	160·20	171·64	183·08	13
157·21	171·50	185·79	200·08	214·38	228·67	14
193·36	210·94	228·52	246·09	263·67	281·25	15
234·67	256·	277·33	298·67	320·	341·33	16
281·47	307·06	332·65	358·24	383·83	409·42	17
334·13	364·50	394·88	425·25	455·63	486·	18
392·96	428·69	464·41	500·14	535·86	571·58	19
458·33	500·	541·67	583·33	625·	666·67	20
530·58	578·81	627·05	675·28	723·52	771·75	21
610·04	665·50	720·96	776·42	831·87	887·33	22
697·07	760·44	823·81	887·18	950·55	1013·92	23
792·	864·	936·	1008·	1080·	1152·	24
895·18	976·56	1057·94	1139·32	1220·70	1302·08	25
1006·96	1098·50	1190·04	1281·58	1373·13	1464·67	26
1127·67	1230·19	1332·70	1435·22	1537·73	1640·25	27
1257·67	1372·	1486·33	1600·67	1715·	1829·33	28
1397·29	1524·31	1651·34	1778·36	1905·39	2032·42	29
1546·88	1687·50	1828·13	1968·75	2109·38	2250·	30
1877·33	2048·	2218·67	2389·33	2560·	2730·67	32
2251·79	2456·50	2661·21	2865·92	3070·63	3275·33	34
2673·	2916·	3159·	3402·	3645·	3888·	36
3143·71	3429·50	3715·29	4001·08	4286·88	4572·67	38
3666·67	4000·	4333·33	4666·67	5000·	5333·33	40
4244·63	4630·50	5016·38	5402·25	5788·13	6174·	42
4880·33	5324·	5767·67	6211·33	6655·	7098·67	44
5576·54	6083·50	6590·46	7097·42	7604·38	8111·33	46
6336·	6912·	7488·	8064·	8640·	9216·	48
7161·46	7812·50	8463·54	9114·58	9765·63	10416·67	50
8055·67	8788·	9520·33	10252·67	10985·	11717·33	52
9021·38	9841·50	10661·63	11481·75	12301·88	13122·	54
10061·33	10976·	11890·67	12805·33	13720·	14634·67	56
11178·29	12194·50	13210·71	14225·92	15243·12	16259·33	58
12375·	13500·	14625·	15750·	16875·	18000·	60

MOMENTS OF INERTIA OF RECTANGLES.

Depths in Inches	Widths in Inches, corresponding to those of Flats, see page 30.									
	8	9	10	12	13	14	16	18	20	24
3/8	·035	·040	·044	·053	·057	·062	·070	·079	·088	·105
7/16	·056	·063	·070	·084	·091	·098	·112	·126	·140	·167
1/2	·083	·094	·104	·125	·135	·146	·167	·187	·208	·250
9/16	·119	·133	·148	·178	·193	·208	·237	·267	·297	·356
5/8	·163	·183	·203	·244	·264	·285	·326	·366	·407	·488
11/16	·217	·244	·271	·325	·352	·379	·433	·487	·542	·650
3/4	·281	·316	·352	·422	·457	·492	·562	·633	·703	·844
13/16	·358	·402	·447	·536	·581	·626	·715	·805	·894	1·073
7/8	·447	·502	·558	·670	·726	·782	·893	1·005	1·117	1·340
15/16	·549	·618	·687	·824	·893	·961	1·099	1·236	1·373	1·648
1	·667	·750	·833	1·000	1·083	1·167	1·333	1·500	1·667	2·000
1 1/16	·800	·900	1·000	1·199	1·299	1·399	1·599	1·799	1·999	2·399
1 1/8	·949	1·068	1·187	1·424	1·542	1·661	1·898	2·136	2·373	2·848
1 3/16	1·116	1·256	1·395	1·675	1·814	1·954	2·233	2·512	2·791	3·349
1 1/4	1·302	1·465	1·628	1·953	2·116	2·279	2·604	2·930	3·255	3·906
1 5/16	1·507	1·696	1·884	2·261	2·449	2·638	3·015	3·391	3·768	4·522
1 3/8	1·733	1·950	2·166	2·600	2·816	3·033	3·466	3·899	4·333	5·199
1 7/16	1·980	2·228	2·475	2·970	3·218	3·466	3·961	4·456	4·951	5·941
1 1/2	2·250	2·531	2·812	3·375	3·656	3·937	4·500	5·062	5·625	6·750
1 9/16	2·543	2·861	3·179	3·815	4·133	4·450	5·086	5·722	6·358	7·629
1 5/8	2·861	3·218	3·576	4·291	4·649	5·006	5·721	6·437	7·152	8·582
1 11/16	3·204	3·604	4·005	4·805	5·206	5·606	6·407	7·208	8·009	9·611
1 3/4	3·573	4·020	4·466	5·359	5·806	6·253	7·146	8·039	8·932	10·719
1 13/16	3·970	4·466	4·962	5·954	6·451	6·947	7·939	8·932	9·924	11·909
1 7/8	4·395	4·944	5·493	6·592	7·141	7·690	8·789	9·888	10·986	13·184
1 15/16	4·849	5·455	6·061	7·273	7·879	8·485	9·698	10·910	12·122	14·546
2	5·333	6·000	6·667	8·000	8·667	9·333	10·667	12·000	13·333	16·000
2 1/16	5·849	6·580	7·311	8·774	9·505	10·236	11·698	13·161	14·623	17·547
2 1/8	6·397	7·197	7·996	9·596	10·395	11·195	12·794	14·394	15·993	19·191
2 3/16	6·978	7·851	8·723	10·468	11·340	12·212	13·957	15·701	17·446	20·935
2 1/4	7·594	8·543	9·492	11·391	12·340	13·289	15·187	17·086	18·984	22·781
2 5/16	8·244	9·275	10·305	12·366	13·397	14·428	16·489	18·550	20·611	24·733
2 3/8	8·931	10·047	11·164	13·396	14·513	15·629	17·862	20·095	22·327	26·793
2 7/16	9·655	10·862	12·068	14·482	15·689	16·896	19·310	21·723	24·137	28·964
2 1/2	10·417	11·719	13·021	15·625	16·927	18·229	20·833	23·437	26·042	31·250
2 9/16	11·218	12·620	14·022	16·826	18·229	19·631	22·435	25·240	28·044	33·653
2 5/8	12·059	13·566	15·073	18·088	19·595	21·103	24·117	27·132	30·146	36·176
2 11/16	12·941	14·558	16·176	19·411	21·028	22·646	25·881	29·116	32·351	38·822
2 3/4	13·865	15·598	17·331	20·797	22·530	24·263	27·729	31·195	34·661	41·594
2 13/16	14·832	16·685	18·539	22·247	24·101	25·955	29·663	33·371	37·079	44·495
2 7/8	15·842	17·823	19·803	23·764	25·744	27·724	31·685	35·646	39·606	47·527
2 15/16	16·898	19·011	21·123	25·347	27·460	29·572	33·797	38·021	42·246	50·695
3	18·000	20·250	22·500	27·000	29·250	31·500	36·000	40·500	45·000	54·000

SHEARING AND BEARING VALUES OF RIVETS.

Dia. of Rivet in inches	Area in Square inches	Shearing Value at 4 tons per sq. inch		BEARING VALUES AT 7 TONS PER SQ. INCH — Thickness in inches of Plate passed through									
		Single Shear	Double Shear	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	7/8
3/8	·1104	·44	·77	·66	·82	..	..	..	..	..	..	..	..
1/2	·1963	·79	1·37	·87	1·09	1·31	1·53	..	..	..	..	..	..
5/8	·3068	1·23	2·15	1·09	1·37	1·64	1·91	2·19	..	..	..	..	..
3/4	·4418	1·77	3·09	1·31	1·64	1·97	2·30	2·62	2·95	3·28	..	..	..
7/8	·6013	2·41	4·21	1·53	1·91	2·30	2·68	3·06	3·45	3·83	4·21	..	..
1	·7854	3·14	5·50	1·75	2·19	2·62	3·06	3·50	3·94	4·37	4·81	5·25	6·12

Dia. of Rivet in inches	Area in Square inches	Shearing Value at 5 tons per sq. inch		BEARING VALUES AT 8¾ TONS PER SQ. INCH — Thickness in inches of Plate passed through									
		Single Shear	Double Shear	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	7/8
3/8	·1104	·55	·97	·82	1·03	..	..	..	..	..	..	..	..
1/2	·1963	·98	1·72	1·09	1·37	1·64	1·91	..	..	..	..	..	..
5/8	·3068	1·53	2·68	1·37	1·71	2·05	2·39	2·73	..	..	..	..	..
3/4	·4418	2·21	3·87	1·64	2·05	2·46	2·87	3·28	3·69	4·10	..	..	..
7/8	·6013	3·01	5·26	1·91	2·39	2·87	3·35	3·83	4·31	4·79	5·26	..	..
1	·7854	3·93	6·87	2·19	2·73	3·28	3·83	4·37	4·92	5·47	6·02	6·56	7·66

Dia. of Rivet in inches	Area in Square inches	Shearing Value at 6 tons per sq. inch		BEARING VALUES AT 10½ TONS PER SQ. INCH — Thickness in inches of Plate passed through									
		Single Shear	Double Shear	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	7/8
3/8	·1104	·66	1·16	·98	1·23	..	..	..	..	..	..	..	..
1/2	·1963	1·18	2·06	1·31	1·64	1·97	2·30	..	..	..	..	..	..
5/8	·3068	1·84	3·22	1·64	2·05	2·46	2·87	3·28	..	..	..	..	..
3/4	·4418	2·65	4·64	1·97	2·46	2·95	3·45	3·94	4·43	4·92	..	..	..
7/8	·6013	3·61	6·31	2·30	2·87	3·45	4·02	4·59	5·17	5·74	6·32	..	..
1	·7854	4·71	8·25	2·62	3·28	3·94	4·59	5·25	5·91	6·56	7·22	7·87	9·19

In the above tables double shear is calculated at 1¾ times single shear; and the bearing stress per square inch at 1¾ times the shearing stress.

The bearing values above and to the right of the upper zigzag lines in the tables are greater than double shear for the corresponding diameters, so that in these cases the shearing values are the determining factors.

The bearing values between the lower and upper zigzag lines are greater than single and less than double shear for the corresponding diameters, so that in case of single shear the shearing value is the determining factor, and in case of double shear the bearing value is the determining factor.

The bearing values below and to the left of the lower zigzag lines are less than single shear, so that in these cases the bearing values are the determining factors.

WEIGHTS OF ANGLES IN LBS. PER LINEAL FOOT.

Thickness of Angle in inches	SUM OF FLANGES IN INCHES										
	2½	3	3½	4	4½	5	5½	6	6½	7	7½
3/16 …	1·47	1·79	2·11	2·43	2·75	…	…	…	…	…	…
… ¼	1·91	2·33	2·77	3·19	3·61	4·04	4·46	4·90	…	…	…
5/16 …	…	2·85	3·39	3·92	4·45	4·98	5·51	6·05	6·58	7·11	7·64
… ⅜	…	…	…	4·62	5·26	5·89	6·53	7·18	7·81	8·45	9·08
7/16 …	…	…	…	…	6·05	6·78	7·53	8·28	9·02	9·76	10·50
… ½	…	…	…	…	…	7·65	8·50	9·36	10·20	11·05	11·90
9/16 …	…	…	…	…	…	…	9·44	10·41	11·36	12·31	13·27
… ⅝	…	…	…	…	…	…	…	11·43	12·49	13·55	14·61
11/16 …	…	…	…	…	…	…	…	…	…	14·76	15·92
… ¾	…	…	…	…	…	…	…	…	…	…	…
… ⅞	…	…	…	…	…	…	…	…	…	…	…
… 1	…	…	…	…	…	…	…	…	…	…	…

AREAS OF ANGLES IN SQUARE INCHES.

Thickness of Angle in inches	SUM OF FLANGES IN INCHES									
	2½	3	3½	4	4½	5	5½	6	6½	7
3/16 ..	·433	·526	·622	·715	·809	..	..	..	..	..
.. ¼	·561	·686	·814	·938	1·063	1·187	1·312	1·440	..	..
5/16 ..	..	·839	·997	1·153	1·309	1·464	1·620	1·779	1·934	2·091
.. ⅜	..	..	..	1·360	1·547	1·733	1·921	2·111	2·298	2·485
7/16 ..	..	..	..	..	1·778	1·995	2·214	2·436	2·653	2·872
.. ½	..	..	..	..	..	2·249	2·499	2·752	3·001	3·251
9/16 ..	..	..	..	..	..	..	2·776	3·061	3·341	3·622
.. ⅝	..	..	..	..	..	..	..	3·362	3·673	3·985
11/16 ..	..	..	..	..	..	..	..	..	..	4·341
.. ¾	..	..	..	..	..	..	..	..	..	..
.. ⅞	..	..	..	..	..	..	..	..	..	..
.. 1	..	..	..	..	..	..	..	..	..	..

WEIGHTS OF ANGLES IN LBS. PER LINEAL FOOT.

SUM OF FLANGES IN INCHES									Thickness of Angle in inches
8	8½	9	9½	10	10½	11	12	16	
...	...	...	...	...	...	...	...	...	3/16
...	...	...	...	...	...	...	...	...	¼
8·17	...	...	...	...	...	...	...	...	5/16
9·72	10·37	11·00	11·64	12·27	...	...	...	...	⅜
11·25	12·01	12·74	13·49	14·23	14·97	15·70	17·21	...	7/16
12·75	13·61	14·46	15·31	16·15	17·00	17·84	19·56	26·35	½
14·22	15·19	16·14	17·10	18·05	19·01	19·95	21·89	29·52	9/16
15·67	16·74	17·80	18·87	19·92	20·98	22·04	24·18	32·67	⅝
17·09	18·27	19·44	20·61	21·77	22·94	24·10	26·45	35·79	11/16
18·49	19·77	21·04	22·32	23·59	24·86	26·13	28·70	38·89	¾
...	...	24·18	25·67	27·15	28·63	30·11	33·11	45·00	⅞
...	...	...	...	30·60	32·30	33·99	37·41	51·00	1

AREAS OF ANGLES IN SQUARE INCHES.

SUM OF FLANGES IN INCHES										Thickness of Angle in inches
7½	8	8½	9	9½	10	10½	11	12	16	
..	..	..	..	..	..	..	..	..	..	3/16
..	..	..	..	..	..	..	..	..	..	¼
2·246	2·402	..	..	..	..	..	..	..	..	5/16
2·671	2·859	3·050	3·236	3·424	3·610	..	..	..	..	⅜
3·089	3·308	3·531	3·748	3·967	4·184	4·403	4·619	5·062	..	7/16
3·499	3·749	4·003	4·252	4·502	4·750	5·000	5·248	5·753	7·750	½
3·902	4·183	4·468	4·748	5·029	5·309	5·590	5·869	6·437	8·683	9/16
4·296	4·609	4·925	5·236	5·549	5·860	6·172	6·482	7·112	9·609	⅝
4·683	5·027	5·375	5·717	6·061	6·403	6·746	7·088	7·780	10·527	11/16
..	5·437	5·816	6·189	6·564	6·938	7·313	7·686	8·441	11·437	¾
..	..	..	7·111	7·549	7·985	8·422	8·857	9·737	13·234	⅞
..	..	..	..	..	9·000	9·500	9·998	11·003	15·000	1

WEIGHT OF FLAT ROLLED STEEL IN LBS. PER LINEAL FOOT.

Width in Inches	THICKNESS IN INCHES							
	$\frac{1}{16}$	⅛	$\frac{3}{16}$	¼	$\frac{5}{16}$	⅜	$\frac{7}{16}$	½
1	·213	·425	·638	·850	1·06	1·28	1·49	1·70
1¼	·266	·531	·797	1·06	1·33	1·59	1·86	2·13
1½	·319	·638	·956	1·28	1·59	1·91	2·23	2·55
1¾	·372	·744	1·12	1·49	1·86	2·23	2·60	2·98
2	·425	·850	1·28	1·70	2·13	2·55	2·98	3·40
2¼	·478	·956	1·43	1·91	2·39	2·87	3·35	3·83
2½	·531	1·06	1·59	2·13	2·66	3·19	3·72	4·25
2¾	·584	1·17	1·75	2·34	2·92	3·51	4·09	4·68
3	·638	1·28	1·91	2·55	3·19	3·83	4·46	5·10
3¼	·691	1·38	2·07	2·76	3·45	4·14	4·83	5·53
3½	·744	1·49	2·23	2·98	3·72	4·46	5·21	5·95
3¾	·797	1·59	2·39	3·19	3·98	4·78	5·58	6·38
4	·850	1·70	2·55	3·40	4·25	5·10	5·95	6·80
4¼	·903	1·81	2·71	3·61	4·52	5·42	6·32	7·23
4½	·956	1·91	2·87	3·83	4·78	5·74	6·69	7·65
4¾	1·01	2·02	3·03	4·04	5·05	6·06	7·07	8·08
5	1·06	2·13	3·19	4·25	5·31	6·38	7·44	8·50
5¼	1·12	2·23	3·35	4·46	5·58	6·69	7·81	8·93
5½	1·17	2·34	3·51	4·68	5·84	7·01	8·18	9·35
5¾	1·22	2·44	3·67	4·89	6·11	7·33	8·55	9·78
6	1·28	2·55	3·83	5·10	6·38	7·65	8·93	10·20
6¼	1·33	2·66	3·98	5·31	6·64	7·97	9·30	10·63
6½	1·38	2·76	4·14	5·53	6·91	8·29	9·67	11·05
6¾	1·43	2·87	4·30	5·74	7·17	8·61	10·04	11·48
7	1·49	2·98	4·46	5·95	7·44	8·93	10·41	11·90
7¼	1·54	3·08	4·62	6·16	7·70	9·24	10·78	12·33
7½	1·59	3·19	4·78	6·38	7·97	9·56	11·16	12·75
7¾	1·65	3·29	4·94	6·59	8·23	9·88	11·53	13·18
8	1·70	3·40	5·10	6·80	8·50	10·20	11·90	13·60
8¼	1·75	3·51	5·26	7·01	8·77	10·52	12·27	14·03
8½	1·81	3·61	5·42	7·23	9·03	10·84	12·64	14·45
8¾	1·86	3·72	5·58	7·44	9·30	11·16	13·02	14·88
9	1·91	3·83	5·74	7·65	9·56	11·48	13·39	15·30
9¼	1·97	3·93	5·90	7·86	9·83	11·80	13·76	15·73
9½	2·02	4·04	6·06	8·08	10·09	12·11	14·13	16·15
9¾	2·07	4·14	6·22	8·29	10·36	12·43	14·50	16·58
10	2·13	4·25	6·38	8·50	10·63	12·75	14·88	17·00
10¼	2·18	4·36	6·53	8·71	10·89	13·07	15·25	17·43
10½	2·23	4·46	6·70	8·93	11·16	13·39	15·62	17·85
10¾	2·28	4·57	6·85	9·14	11·42	13·71	15·99	18·28
11	2·34	4·68	7·01	9·35	11·69	14·03	16·36	18·70
11¼	2·39	4·78	7·17	9·56	11·95	14·34	16·73	19·13
11½	2·44	4·89	7·33	9·78	12·22	14·66	17·11	19·55
11¾	2·50	5·00	7·49	9·99	12·48	14·98	17·48	19·98
12	2·55	5·10	7·65	10·20	12·75	15·30	17·85	20·40

WEIGHT OF FLAT ROLLED STEEL IN LBS. PER LINEAL FOOT.

THICKNESS IN INCHES								Width in Inches
9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	
1·91	2·13	2·34	2·55	2·76	2·98	3·19	3·40	1
2·39	2·66	2·92	3·19	3·45	3·72	3·98	4·25	1¼
2·87	3·19	3·51	3·83	4·14	4·46	4·78	5·10	1½
3·35	3·72	4·09	4·46	4·83	5·21	5·58	5·95	1¾
3·83	4·25	4·68	5·10	5·53	5·95	6·38	6·80	2
4·30	4·78	5·26	5·74	6·22	6·69	7·17	7·65	2¼
4·78	5·31	5·84	6·38	6·91	7·44	7·97	8·50	2½
5·26	5·84	6·43	7·01	7·60	8·18	8·77	9·35	2¾
5·74	6·38	7·01	7·65	8·29	8·93	9·56	10·20	3
6·22	6·91	7·60	8·29	8·98	9·67	10·36	11·05	3¼
6·70	7·44	8·18	8·93	9·67	10·41	11·16	11·90	3½
7·17	7·97	8·77	9·56	10·36	11·16	11·95	12·75	3¾
7·65	8·50	9·35	10·20	11·05	11·90	12·75	13·60	4
8·13	9·03	9·93	10·84	11·74	12·64	13·55	14·45	4¼
8·61	9·56	10·52	11·48	12·43	13·39	14·34	15·30	4½
9·08	10·09	11·10	12·11	13·12	14·13	15·14	16·15	4¾
9·56	10·63	11·69	12·75	13·81	14·88	15·94	17·00	5
10·04	11·16	12·27	13·39	14·50	15·62	16·73	17·85	5¼
10·52	11·69	12·86	14·03	15·19	16·36	17·53	18·70	5½
11·00	12·22	13·44	14·66	15·88	17·11	18·33	19·55	5¾
11·48	12·75	14·05	15·30	16·58	17·85	19·13	20·40	6
11·95	13·28	14·61	15·94	17·27	18·59	19·92	21·25	6¼
12·43	13·81	15·19	16·58	17·96	19·34	20·72	22·10	6½
12·91	14·34	15·78	17·21	18·65	20·08	21·52	22·95	6¾
13·39	14·88	16·36	17·85	19·34	20·83	22·31	23·80	7
13·87	15·41	16·95	18·49	20·03	21·57	23·11	24·65	7¼
14·34	15·94	17·53	19·13	20·72	22·31	23·91	25·50	7½
14·82	16·47	18·12	19·76	21·41	23·06	24·70	26·35	7¾
15·30	17·00	18·70	20·40	22·10	23·80	25·50	27·20	8
15·78	17·53	19·28	21·04	22·79	24·54	26·30	28·05	8¼
16·26	18·06	19·87	21·68	23·48	25·29	27·10	28·90	8½
16·73	18·59	20·45	22·31	24·17	26·03	27·89	29·75	8¾
17·21	19·13	21·04	22·95	24·86	26·78	28·69	30·60	9
17·69	19·66	21·62	23·59	25·55	27·52	29·48	31·45	9¼
18·17	20·19	22·21	24·23	26·24	28·26	30·28	32·30	9½
18·65	20·72	22·79	24·86	26·93	29·01	31·08	33·15	9¾
19·13	21·25	23·38	25·50	27·63	29·75	31·88	34·00	10
19·60	21·78	23·96	26·14	28·32	30·49	32·67	34·85	10¼
20·08	22·31	24·54	26·78	29·01	31·24	33·47	35·70	10½
20·56	22·84	25·13	27·41	29·70	31·98	34·27	36·55	10¾
21·04	23·38	25·71	28·05	30·39	32·73	35·06	37·40	11
21·52	23·91	26·30	28·69	31·08	33·47	35·86	38·25	11¼
22·00	24·44	26·88	29·33	31·77	34·21	36·66	39·10	11½
22·47	24·97	27·47	29·96	32·46	34·96	37·45	39·95	11¾
22·95	25·50	28·05	30·60	33·15	35·70	38·25	40·80	12

DORMAN, LONG & CO. LIMITED.

WEIGHT OF FLAT ROLLED STEEL IN LBS. PER LINEAL FOOT.

Width in Inches	THICKNESS IN INCHES							
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$
13	2·76	5·53	8·29	11·05	13·81	16·58	19·34	22·10
14	2·98	5·95	8·93	11·90	14·88	17·85	20·83	23·80
15	3·19	6·38	9·56	12·75	15·94	19·13	22·31	25·50
16	3·40	6·80	10·20	13·60	17·00	20·40	23·80	27·20
17	3·61	7·23	10·84	14·45	18·06	21·68	25·29	28·90
18	3·83	7·65	11·48	15·30	19·13	22·95	26·78	30·60
19	4·04	8·08	12·11	16·15	20·19	24·23	28·26	32·30
20	4·25	8·50	12·75	17·00	21·25	25·50	29·75	34·00
21	4·46	8·93	13·39	17·85	22·31	26·78	31·24	35·70
22	4·68	9·35	14·03	18·70	23·38	28·05	32·72	37·40
23	4·89	9·78	14·66	19·55	24·44	29·33	34·21	39·10
24	5·10	10·20	15·30	20·40	25·50	30·60	35·70	40·80
25	5·31	10·63	15·94	21·25	26·56	31·88	37·19	42·50
26	5·53	11·05	16·58	22·10	27·63	33·15	38·68	44·20
27	5·74	11·48	17·21	22·95	28·69	34·43	40·16	45·90
28	5·95	11·90	17·85	23·80	29·75	35·70	41·65	47·60
29	6·16	12·33	18·49	24·65	30·81	36·98	43·14	49·30
30	6·38	12·75	19·13	25·50	31·88	38·25	44·63	51·00
31	6·59	13·18	19·76	26·35	32·94	39·53	46·11	52·70
32	6·80	13·60	20·40	27·20	34·00	40·80	47·60	54·40
33	7·01	14·03	21·04	28·05	35·06	42·08	49·09	56·10
34	7·23	14·45	21·68	28·90	36·13	43·35	50·58	57·80
35	7·44	14·88	22·31	29·75	37·19	44·63	52·06	59·50
36	7·65	15·30	22·95	30·60	38·25	45·90	53·55	61·20
37	7·86	15·73	23·59	31·45	39·31	47·18	55·04	62·90
38	8·08	16·15	24·23	32·30	40·38	48·45	56·53	64·60
39	8·29	16·58	24·86	33·15	41·44	49·73	58·01	66·30
40	8·50	17·00	25·50	34·00	42·50	51·00	59·50	68·00
41	8·71	17·43	26·14	34·85	43·56	52·28	60·99	69·70
42	8·93	17·85	26·78	35·70	44·63	53·55	62·48	71·40
43	9·14	18·28	27·41	36·55	45·69	54·83	63·96	73·10
44	9·35	18·70	28·05	37·40	46·75	56·10	65·45	74·80
45	9·56	19·13	28·69	38·25	47·81	57·38	66·94	76·50
46	9·78	19·55	29·33	39·10	48·88	58·65	68·43	78·20
47	9·99	19·98	29·96	39·95	49·94	59·93	69·91	79·90
48	10·20	20·40	30·60	40·80	51·00	61·20	71·40	81·60
50	10·63	21·25	31·88	42·50	53·13	63·75	74·38	85·00
52	11·05	22·10	33·15	44·20	55·25	66·30	77·35	88·40
54	11·48	22·95	34·43	45·90	57·38	68·85	80·33	91·80

VALUES FOR ADDITIONAL WIDTHS OF ¼", ½" AND ¾".

¼	·053	·106	·159	·213	·266	·319	·372	·425
.. ½ ..	·106	·213	·319	·425	·531	·638	·744	·850
.. .. ¾	·159	·319	·478	·638	·797	·956	1·116	1·275

WEIGHT OF FLAT ROLLED STEEL IN LBS. PER LINEAL FOOT.

THICKNESS IN INCHES								Width in Inches
$\frac{9}{16}$	⅝	$\frac{11}{16}$	¾	$\frac{13}{16}$	⅞	$\frac{15}{16}$	1	
24·86	27·63	30·39	33·15	35·91	38·68	41·44	44·20	13
26·78	29·75	32·73	35·70	38·66	41·65	44·63	47·60	14
28·69	31·88	35·06	38·25	41·44	44·63	47·81	51·00	15
30·60	34·00	37·40	40·80	44·20	47·60	51·00	54·40	16
32·51	36·13	39·74	43·35	46·96	50·58	54·19	57·80	17
34·43	38·25	42·08	45·90	49·73	53·55	57·38	61·20	18
36·34	40·38	44·41	48·45	52·49	56·53	60·56	64·60	19
38·25	42·50	46·75	51·00	55·25	59·50	63·75	68·00	20
40·16	44·63	49·09	53·55	58·01	62·48	66·94	71·40	21
42·08	46·75	51·43	56·10	60·78	65·45	70·13	74·80	22
43·99	48·88	53·76	58·65	63·54	68·43	73·31	78·20	23
45·90	51·00	56·10	61·20	66·30	71·40	76·50	81·60	24
47·81	53·13	58·44	63·75	69·06	74·38	79·69	85·00	25
49·73	55·25	60·78	66·30	71·83	77·35	82·88	88·40	26
51·64	57·38	63·11	68·85	74·59	80·33	86·06	91·80	27
53·55	59·50	65·45	71·40	77·35	83·30	89·25	95·20	28
55·46	61·63	67·79	73·95	80·11	86·28	92·44	98·60	29
57·38	63·75	70·13	76·50	82·88	89·25	95·63	102·00	30
59·29	65·88	72·46	79·05	85·64	92·23	98·81	105·40	31
61·20	68·00	74·80	81·60	88·40	95·20	102·00	108·80	32
63·11	70·13	77·14	84·15	91·16	98·18	105·19	112·20	33
65·03	72·25	79·48	86·70	93·93	101·15	108·38	115·60	34
66·94	74·38	81·81	89·25	96·69	104·13	111·56	119·00	35
68·85	76·50	84·15	91·80	99·45	107·10	114·75	122·40	36
70·76	78·63	86·49	94·35	102·21	110·08	117·94	125·80	37
72·68	80·75	88·83	96·90	104·98	113·05	121·13	129·20	38
74·59	82·88	91·16	99·45	107·74	116·03	124·31	132·60	39
76·50	85·00	93·50	102·00	110·50	119·00	127·50	136·00	40
78·41	87·13	95·84	104·55	113·26	121·98	130·69	139·40	41
80·33	89·25	98·18	107·10	116·03	124·95	133·88	142·80	42
82·24	91·38	100·51	109·65	118·79	127·93	137·06	146·20	43
84·15	93·50	102·85	112·20	121·55	130·90	140·25	149·60	44
86·06	95·63	105·19	114·75	124·31	133·88	143·44	153·00	45
87·98	97·75	107·53	117·30	127·08	136·85	146·63	156·40	46
89·89	99·88	109·86	119·85	129·84	139·83	149·81	159·80	47
91·80	102·00	112·20	122·40	132·60	142·80	153·00	163·20	48
95·63	106·25	116·88	127·50	138·13	148·75	159·38	170·00	50
99·45	110·50	121·55	132·60	143·65	154·70	165·75	176·80	52
103·28	114·75	126·23	137·70	149·18	160·65	172·13	183·60	54

VALUES FOR ADDITIONAL WIDTHS OF ¼″, ½″ AND ¾″.

·478	·531	·584	·638	·691	·744	·797	·850	.. .. ¼
·956	1·063	1·169	1·275	1·381	1·488	1·594	1·700	.. ½ ..
1·434	1·594	1·753	1·913	2·072	2·231	2·391	2·550	¾ .. ..

WEIGHT OF ROUND AND SQUARE STEEL BARS IN LBS. PER LINEAL FOOT.

Diameter or Side in inches	Round ●	Square ■	Diameter or Side in inches	Round ●	Square ■	Diameter or Side in inches	Round ●	Square ■
¼	·167	·213	1¼	4·172	5·312	3	24·03	30·60
5/16	·261	·332	1⅜	5·049	6·428	3¼	28·21	35·91
⅜	·376	·478	1½	6·008	7·650	3½	32·71	41·65
7/16	·511	·651	1⅝	7·051	8·978	3¾	37·55	47·81
½	·668	·849	1¾	8·178	10·412	4	42·73	54·40
9/16	·845	1·076	1⅞	9·388	11·953	4¼	48·23	61·41
⅝	1·043	1·328	2	10·681	13·600	4½	54·07	68·85
11/16	1·262	1·607	2⅛	12·06	15·35	4¾	60·25	76·71
¾	1·502	1·912	2¼	13·52	17·21	5	66·76	85·00
13/16	1·763	2·245	2⅜	15·06	19·18	5¼	73·60	93·71
⅞	2·044	2·603	2½	16·69	21·25	5½	80·78	102·85
15/16	2·347	2·988	2⅝	18·40	23·43	5¾	88·29	112·41
1	2·670	3·400	2¾	20·19	25·71	6	96·13	122·40
1⅛	3·380	4·303	2⅞	22·07	28·10			

WHITWORTH'S STANDARD SIZES OF BOLTS AND NUTS.

Diameter of Bolt in inches		No. of Threads per inch	Diameter at bottom of Thread in inches	Distance over Flats in inches	Distance over Corners in inches	Thickness of Bolt Head in inches	Sectional Area at bottom of Thread in square inches
Fractional Sizes	Decimal Sizes						
¼	·25	20	·186	·525	·606	·219	·027
⅜	·375	16	·295	·709	·819	·328	·068
½	·5	12	·393	·919	1·061	·437	·121
⅝	·625	11	·508	1·101	1·271	·547	·203
¾	·75	10	·622	1·301	1·502	·656	·304
⅞	·875	9	·733	1·479	1·707	·766	·422
1	1·0	8	·840	1·670	1·928	·875	·554
1⅛	1·125	7	·942	1·860	2·148	·984	·697
1¼	1·25	7	1·067	2·048	2·365	1·094	·894
1⅜	1·375	6	1·161	2·215	2·557	1·203	1·060
1½	1·5	6	1·286	2·413	2·787	1·312	1·300

DORMAN, LONG & CO. LIMITED.

CALCULATED WEIGHTS IN POUNDS OF WHITWORTH'S STANDARD BOLTS & NUTS.

Hexagonal Head and Nut.

Length A in inches	DIAMETER OF BOLT IN INCHES										
	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
1	·042	·106	·222	·376	·612	…	…	…	…	…	…
1 1/8	·044	·110	·229	·387	·628	…	…	…	…	…	…
1 1/4	·046	·114	·236	·398	·643	·944	…	…	…	…	…
1 3/8	·047	·118	·243	·408	·659	·965	…	…	…	…	…
1 1/2	·049	·122	·250	·419	·675	·986	1·394	…	…	…	…
1 5/8	·050	·126	·257	·430	·690	1·008	1·421	…	…	…	…
1 3/4	·052	·130	·264	·441	·706	1·029	1·449	1·966	…	…	…
1 7/8	·054	·134	·271	·452	·722	1·050	1·477	2·001	…	…	…
2	·056	·138	·278	·463	·737	1·072	1·505	2·036	2·671	…	…
2 1/4	·059	·145	·292	·484	·769	1·114	1·561	2·107	2·758	…	…
2 1/2	·063	·153	·306	·506	·800	1·157	1·616	2·177	2·845	3·572	…
2 3/4	·065	·161	·319	·528	·831	1·199	1·672	2·247	2·932	3·678	…
3	·069	·169	·333	·549	·862	1·242	1·727	2·318	3·019	3·783	4·766
3 1/4	·071	·177	·347	·571	·894	1·284	1·783	2·388	3·106	3·888	4·891
3 1/2	·075	·185	·361	·593	·925	1·327	1·838	2·459	3·193	3·993	5·016
3 3/4	·079	·192	·375	·615	·956	1·369	1·895	2·529	3·280	4·098	5·142
4	·082	·200	·389	·637	·988	1·412	1·950	2·600	3·367	4·204	5·267
4 1/4	·085	·208	·403	·658	1·019	1·455	2·005	2·670	3·454	4·309	5·392
4 1/2	·089	·216	·417	·680	1·050	1·497	2·061	2·740	3·541	4·414	5·517
4 3/4	·092	·224	·431	·702	1·081	1·540	2·116	2·810	3·627	4·519	5·642
5	·096	·232	·445	·724	1·113	1·583	2·172	2·881	3·714	4·624	5·767
5 1/4	·099	·240	·459	·745	1·144	1·625	2·228	2·952	3·801	4·730	5·893
5 1/2	·103	·247	·473	·767	1·175	1·667	2·283	3·022	3·888	4·835	6·018
5 3/4	·106	·255	·486	·789	1·207	1·710	2·339	3·092	3·975	4·940	6·143
6	·110	·263	·500	·810	1·238	1·753	2·394	3·163	4·062	5·045	6·268
6 1/2	·117	·279	·528	·854	1·300	1·838	2·506	3·303	4·236	5·256	6·518
7	·124	·294	·556	·897	1·363	1·923	2·617	3·444	4·410	5·466	6·769
7 1/2	·130	·310	·584	·941	1·425	2·008	2·728	3·585	4·584	5·676	7·019
8	·138	·326	·612	·984	1·488	2·094	2·839	3·726	4·757	5·887	7·270
8 1/2	…	·341	·639	1·028	1·550	2·179	2·950	3·867	4·931	6·097	7·520
9	…	·357	·667	1·071	1·613	2·264	3·062	4·008	5·105	6·308	7·770
9 1/2	…	…	·695	1·115	1·676	2·349	3·173	4·149	5·279	6·518	8·021
10	…	…	·723	1·158	1·738	2·434	3·284	4·290	5·453	6·728	8·271
10 1/2	…	…	…	1·202	1·801	2·519	3·396	4·430	5·627	6·939	8·521
11	…	…	…	1·245	1·863	2·605	3·507	4·571	5·800	7·149	8·772
11 1/2	…	…	…	…	1·926	2·689	3·618	4·712	5·974	7·360	9·022
12	…	…	…	…	1·989	2·775	3·729	4·853	6·148	7·570	9·272
Weight in lbs. of one Nut	·0134	·0346	·0737	·1304	·2164	·3203	·4611	·6379	·8513	1·075	1·368
Weight in lbs. of Shank per 1 inch of length	·0139	·0313	·0557	·0869	·1252	·1705	·2225	·2817	·3477	·4208	·5007
Weight in lbs. of Shank per 1 foot of length	·167	·376	·668	1·043	1·502	2·044	2·670	3·380	4·172	5·049	6·008

BOLTS, NUTS AND WASHERS.

APPROXIMATE WEIGHTS AND SIZES.

LEWIS BOLTS AND NUTS.

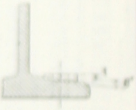
Dimensions in Inches and Weights in Lbs.

Diameter D	A	E	F	Concrete B	Concrete C	Concrete lbs. each	York Stone B	York Stone C	York Stone lbs. each	Granite B	Granite C	Granite lbs. each
3/4	3 1/4	1·35	3/4	9	12 1/4	2·63	4 1/8	7 5/8	1·54	2 5/8	5 1/8	1·21
7/8	3 3/4	1·57	7/8	10 1/2	14 1/4	4·14	4 13/16	8 5/16	2·47	3 1/16	6 13/16	1·89
1	4 1/8	1·80	1	12	16 1/2	6·14	5 1/2	9 3/8	3·56	3 1/2	7 5/8	2·77
1 1/8	4 1/2	2·02	1 1/8	13 1/2	18	8·68	6 5/16	10 1/4	5·01	3 15/16	8 1/16	3·88
1 1/4	4 3/4	2·25	1 1/4	15	19 3/4	11·80	6 7/8	11 3/8	6·76	4 3/8	9 1/8	5·21
1 1/2	5 1/2	2·70	1 1/2	18	23 1/2	20·21	8 1/4	13 3/4	11·51	5 1/4	10 3/4	8·83

ORDINARY WASHERS.

Diameter of Bolt in inches	Outside Diameter of Washers in inches	Thickness in inches	Weight in lbs. per 100
1/2	1 1/4	1/8	2 1/2
5/8	1 3/8	1/8	4
3/4	1 1/2	1/8	5 1/2
7/8	1 3/4	1/8	7 1/2
1	2 1/8	3/16	14
1 1/8	2 3/8	3/16	17 1/2
1 1/4	2 1/2	3/16	21 1/2
1 3/8	2 3/4	3/16	26
1 1/2	3 1/8	3/16	30 1/2

BEVELLED WASHERS.



Diameter of Bolt in inches	Outside Diameter of Washers in inches	Thickness in inches t	Weight in lbs. per 100
1/2	1 1/8	3/16	4
5/8	1 3/8	3/16	6
3/4	1 1/2	3/16	8
7/8	1 3/4	3/16	11
1	2 1/8	3/16	14

APPROXIMATE WEIGHTS AND SIZES OF GAS TUBING.

Nominal Bore in inches	3/4	1	1 1/4	1 1/2	1 3/4
External Diameter in inches	1 1/16	1 5/16	1 5/8	1 7/8	2 1/8
Weight in lbs. per lineal foot	1·176	1·680	2·464	3·136	3·465

APPROXIMATE WEIGHT IN LBS. OF 100 STEEL CUP-HEADED RIVETS.

Length A in inches	Diameter of Rivet in Inches					
	⅜	½	⅝	¾	⅞	1
1	4·89	9·71	..	..	..	..
1⅛	5·28	10·40	..	..	..	..
1¼	5·67	11·10	..	..	..	..
1⅜	6·06	11·79	..	..	..	..
1½	6·45	12·48	21·19	32·86	..	..
1⅝	6·84	13·18	22·27	34·42	..	..
1¾	7·23	13·87	23·36	35·98	..	..
1⅞	7·62	14·57	24·45	37·55	..	..
2	8·01	15·26	25·53	39·11	56·43	77·88
2⅛	8·40	15·96	26·62	40·68	58·56	80·66
2¼	8·79	16·65	27·71	42·24	60·68	83·44
2⅜	9·18	17·34	28·79	43·81	62·81	86·22
2½	9·57	18·04	29·88	45·37	64·94	89·01
2⅝	9·96	18·73	30·97	46·94	67·07	91·79
2¾	10·35	19·42	32·05	48·50	69·20	94·57
2⅞	10·74	20·12	33·14	50·07	71·33	97·35
3	11·14	20·81	34·23	51·63	73·46	100·13
3⅛	..	21·50	35·31	53·19	75·59	102·91
3¼	..	22·20	36·40	54·76	77·72	105·69
3⅜	..	22·89	37·48	56·32	79·85	108·47
3½	..	23·59	38·57	57·89	81·98	111·26
3⅝	..	..	39·66	59·45	84·11	114·04
3¾	..	..	40·74	61·02	86·23	116·82
3⅞	..	..	41·83	62·58	88·36	122·38
4	..	..	42·92	64·15	90·49	125·16
4⅛	..	..	..	65·71	92·62	127·94
4¼	..	..	..	67·28	94·75	130·72
4⅜	..	..	..	68·84	96·88	133·51
4½	..	..	..	70·41	99·01	136·29
4⅝	..	..	..	71·97	101·14	139·07
4¾	..	..	..	..	103·27	141·85
4⅞	..	..	..	..	105·40	144·63
5	..	..	..	..	107·53	147·41
5⅛	..	..	..	..	109·66	150·19
5¼	..	..	..	..	111·78	152·97
5⅜	..	..	..	..	..	155·76
5½	..	..	..	..	..	158·54
5⅝	..	..	..	..	..	161·32
5¾	..	..	..	..	..	164·10
5⅞	..	..	..	..	..	166·88
6	..	..	..	..	..	169·61
Approximate weight in lbs. of 100 Heads	1·76	4·16	8·15	14·08	22·36	33·38
Weight in lbs. per Rivet of 1 inch in length of shank	·0313	·0555	·0869	·1252	·1703	·2225

DORMAN, LONG & CO. LIMITED.

DECIMALS OF A FOOT FOR EACH $\frac{1}{64}$TH OF AN INCH.

Inch	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	11″
0	0	·0833	·1667	·2500	·3333	·4167	·5000	·5833	·6667	·7500	·8333	·9167
$\frac{1}{64}$	·0013	·0846	·1680	·2513	·3346	·4180	·5013	·5846	·6680	·7513	·8346	·9180
$\frac{1}{32}$	·0026	·0859	·1693	·2526	·3359	·4193	·5026	·5859	·6693	·7526	·8359	·9193
$\frac{3}{64}$	·0039	·0872	·1706	·2539	·3372	·4206	·5039	·5872	·6706	·7539	·8372	·9206
$\frac{1}{16}$	·0052	·0885	·1719	·2552	·3385	·4219	·5052	·5885	·6719	·7552	·8385	·9219
$\frac{5}{64}$	·0065	·0898	·1732	·2565	·3398	·4232	·5065	·5898	·6732	·7565	·8398	·9232
$\frac{3}{32}$	·0078	·0911	·1745	·2578	·3411	·4245	·5078	·5911	·6745	·7578	·8411	·9245
$\frac{7}{64}$	·0091	·0924	·1758	·2591	·3424	·4258	·5091	·5924	·6758	·7591	·8424	·9258
⅛	·0104	·0937	·1771	·2604	·3437	·4271	·5104	·5937	·6771	·7604	·8437	·9271
$\frac{9}{64}$	·0117	·0951	·1784	·2617	·3451	·4284	·5117	·5951	·6784	·7617	·8451	·9284
$\frac{5}{32}$	·0130	·0964	·1797	·2630	·3464	·4297	·5130	·5964	·6797	·7630	·8464	·9297
$\frac{11}{64}$	·0143	·0977	·1810	·2643	·3477	·4310	·5143	·5977	·6810	·7643	·8477	·9310
$\frac{3}{16}$	·0156	·0990	·1823	·2656	·3490	·4323	·5156	·5990	·6823	·7656	·8490	·9323
$\frac{13}{64}$	·0169	·1003	·1836	·2669	·3503	·4336	·5169	·6003	·6836	·7669	·8503	·9336
$\frac{7}{32}$	·0182	·1016	·1849	·2682	·3516	·4349	·5182	·6016	·6849	·7682	·8516	·9349
$\frac{15}{64}$	·0195	·1029	·1862	·2695	·3529	·4362	·5195	·6029	·6862	·7695	·8529	·9362
¼	·0208	·1042	·1875	·2708	·3542	·4375	·5208	·6042	·6875	·7708	·8542	·9375
$\frac{17}{64}$	·0221	·1055	·1888	·2721	·3555	·4388	·5221	·6055	·6888	·7721	·8555	·9388
$\frac{9}{32}$	·0234	·1068	·1901	·2734	·3568	·4401	·5234	·6068	·6901	·7734	·8568	·9401
$\frac{19}{64}$	·0247	·1081	·1914	·2747	·3581	·4414	·5247	·6081	·6914	·7747	·8581	·9414
$\frac{5}{16}$	·0260	·1094	·1927	·2760	·3594	·4427	·5260	·6094	·6927	·7760	·8594	·9427
$\frac{21}{64}$	·0273	·1107	·1940	·2773	·3607	·4440	·5273	·6107	·6940	·7773	·8607	·9440
$\frac{11}{32}$	·0286	·1120	·1953	·2786	·3620	·4453	·5286	·6120	·6953	·7786	·8620	·9453
$\frac{23}{64}$	·0299	·1133	·1966	·2799	·3633	·4466	·5299	·6133	·6966	·7799	·8633	·9466
⅜	·0312	·1146	·1979	·2812	·3646	·4479	·5312	·6146	·6979	·7812	·8646	·9479
$\frac{25}{64}$	·0326	·1159	·1992	·2826	·3659	·4492	·5326	·6159	·6992	·7826	·8659	·9492
$\frac{13}{32}$	·0339	·1172	·2005	·2839	·3672	·4505	·5339	·6172	·7005	·7839	·8672	·9505
$\frac{27}{64}$	·0352	·1185	·2018	·2852	·3685	·4518	·5352	·6185	·7018	·7852	·8685	·9518
$\frac{7}{16}$	·0365	·1198	·2031	·2365	·3698	·4531	·5365	·6198	·7031	·7865	·8698	·9531
$\frac{29}{64}$	·0378	·1211	·2044	·2878	·3711	·4544	·5378	·6211	·7044	·7878	·8711	·9544
$\frac{15}{32}$	·0391	·1224	·2057	·2891	·3724	·4557	·5391	·6224	·7057	·7891	·8724	·9557
$\frac{31}{64}$	·0404	·1237	·2070	·2904	·3737	·4570	·5404	·6237	·7070	·7904	·8737	·9570
½	·0417	·1250	·2083	·2917	·3750	·4583	·5417	·6250	·7083	·7917	·8750	·9583

DECIMALS OF A FOOT FOR EACH $\frac{1}{64}$TH OF AN INCH.

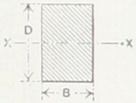
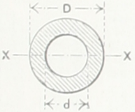
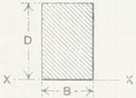
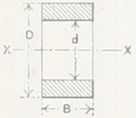
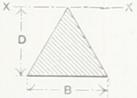
Inch	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	11″
$\frac{33}{64}$	·0430	·1263	·2096	·2930	·3763	·4596	·5430	·6263	·7096	·7930	·8763	·9596
... $\frac{17}{32}$	·0443	·1276	·2109	·2943	·3776	·4609	·5443	·6276	·7109	·7943	·8776	·9609
$\frac{35}{64}$	·0456	·1289	·2122	·2956	·3789	·4622	·5456	·6289	·7122	·7956	·8789	·9622
... ... $\frac{9}{16}$ ...	·0469	·1302	·2135	·2969	·3802	·4635	·5469	·6302	·7135	·7969	·8802	·9635
$\frac{37}{64}$	·0482	·1315	·2148	·2982	·3815	·4648	·5482	·6315	·7148	·7982	·8815	·9648
... $\frac{19}{32}$	·0495	·1328	·2161	·2995	·3828	·4661	·5495	·6328	·7161	·7995	·8828	·9661
$\frac{39}{64}$	·0508	·1341	·2174	·3008	·3841	·4674	·5508	·6341	·7174	·8008	·8841	·9674
... ... ⅝	·0521	·1354	·2188	·3021	·3854	·4688	·5521	·6354	·7188	·8021	·8854	·9688
$\frac{41}{64}$	·0534	·1367	·2201	·3034	·3867	·4701	·5534	·6367	·7201	·8034	·8867	·9701
... $\frac{21}{32}$	·0547	·1380	·2214	·3047	·3880	·4714	·5547	·6380	·7214	·8047	·8880	·9714
$\frac{43}{64}$	·0560	·1393	·2227	·3060	·3893	·4727	·5560	·6393	·7227	·8060	·8893	·9727
... ... $\frac{11}{16}$ ...	·0573	·1406	·2240	·3073	·3906	·4740	·5573	·6406	·7240	·8073	·8906	·9740
$\frac{45}{64}$	·0586	·1419	·2253	·3086	·3919	·4753	·5586	·6419	·7253	·8086	·8919	·9753
... $\frac{23}{32}$	·0599	·1432	·2266	·3099	·3932	·4766	·5599	·6432	·7266	·8099	·8932	·9766
$\frac{47}{64}$	·0612	·1445	·2279	·3112	·3945	·4779	·5612	·6445	·7279	·8112	·8945	·9779
... ... ¾	·0625	·1458	·2292	·3125	·3958	·4792	·5625	·6458	·7292	·8125	·8958	·9792
$\frac{49}{64}$	·0638	·1471	·2305	·3138	·3971	·4805	·5638	·6471	·7305	·8138	·8971	·9805
... $\frac{25}{32}$	·0651	·1484	·2318	·3151	·3984	·4818	·5651	·6484	·7318	·8151	·8984	·9818
$\frac{51}{64}$	·0664	·1497	·2331	·3164	·3997	·4831	·5664	·6497	·7331	·8164	·8997	·9831
... ... $\frac{13}{16}$ ...	·0677	·1510	·2344	·3177	·4010	·4844	·5677	·6510	·7344	·8177	·9010	·9844
$\frac{53}{64}$	·0690	·1523	·2357	·3190	·4023	·4857	·5690	·6523	·7357	·8190	·9023	·9857
... $\frac{27}{32}$	·0703	·1536	·2370	·3203	·4036	·4870	·5703	·6536	·7370	·8203	·9036	·9870
$\frac{55}{64}$	·0716	·1549	·2383	·3216	·4049	·4883	·5716	·6549	·7383	·8216	·9049	·9883
... ... ⅞	·0729	·1562	·2396	·3229	·4062	·4896	·5729	·6562	·7396	·8229	·9062	·9896
$\frac{57}{64}$	·0742	·1576	·2409	·3242	·4076	·4909	·5742	·6576	·7409	·8242	·9076	·9909
... $\frac{29}{32}$	·0755	·1589	·2422	·3255	·4089	·4922	·5755	·6589	·7422	·8255	·9089	·9922
$\frac{59}{64}$	·0768	·1602	·2435	·3268	·4102	·4935	·5768	·6602	·7435	·8268	·9102	·9935
... ... $\frac{15}{16}$ ...	·0781	·1615	·2448	·3281	·4115	·4948	·5781	·6615	·7448	·8281	·9115	·9943
$\frac{61}{64}$	·0794	·1628	·2461	·3294	·4128	·4961	·5794	·6628	·7461	·8294	·9128	·9961
... $\frac{31}{32}$	·0807	·1641	·2474	·3307	·4141	·4974	·5807	·6641	·7474	·8307	·9141	·9974
$\frac{63}{64}$	·0820	·1654	·2487	·3320	·4154	·4987	·5820	·6654	·7487	·8320	·9154	·9987
... ... 1	..	..	..	..	..	..	..	..	..	..	..	1·0000

DECIMAL EQUIVALENTS.

EXACT DECIMAL EQUIVALENTS OF THE FRACTION OF AN INCH.

Fractions				Decimals	Fractions				Decimals
1/64	...	...	...	·015625	33/64	...	...	...	·515625
...	1/32	...	...	·03125	...	17/32	...	...	·53125
3/64	...	...	...	·046875	35/64	...	...	...	·546875
...	...	1/16	...	·0625	...	...	9/16	...	·5625
5/64	...	...	...	·078125	37/64	...	...	...	·578125
...	3/32	...	...	·09375	...	19/32	...	...	·59375
7/64	...	...	...	·109375	39/64	...	...	...	·609375
...	...	...	⅛	·125	...	...	...	⅝	·625
9/64	...	...	...	·140625	41/64	...	...	...	·640625
...	5/32	...	...	·15625	...	21/32	...	...	·65625
11/64	...	...	...	·171875	43/64	...	...	...	·671875
...	...	3/16	...	·1875	...	...	11/16	...	·6875
13/64	...	...	...	·203125	45/64	...	...	...	·703125
...	7/32	...	...	·21875	...	23/32	...	...	·71875
15/64	...	...	...	·234375	47/64	...	...	...	·734375
...	...	...	¼	·25	...	...	...	¾	·75
17/64	...	...	...	·265625	49/64	...	...	...	·765625
...	9/32	...	...	·28125	...	25/32	...	...	·78125
19/64	...	...	...	·296875	51/64	...	...	...	·796875
...	...	5/16	...	·3125	...	...	13/16	...	·8125
21/64	...	...	...	·328125	53/64	...	...	...	·828125
...	11/32	...	...	·34375	...	27/32	...	...	·84375
23/64	...	...	...	·359375	55/64	...	...	...	·859375
...	...	...	⅜	·375	...	...	...	⅞	·875
25/64	...	...	...	·390625	57/64	...	...	...	·890625
...	13/32	...	...	·40625	...	29/32	...	...	·90625
27/64	...	...	...	·421875	59/64	...	...	...	·921875
...	...	7/16	...	·4375	...	...	15/16	...	·9375
29/64	...	...	...	·453125	61/64	...	...	...	·953125
...	15/32	...	...	·46875	...	31/32	...	...	·96875
31/64	...	...	...	·484375	63/64	...	...	...	·984375
...	...	...	½	·5	...	...	...	1	1·00

MOMENTS OF INERTIA OF VARIOUS SECTIONS.

Sections	Moments of Inertia about x x	Sections	Moments of Inertia about x x
	$\frac{B.D^3}{12}$		$\frac{\pi(D^4 - d^4)}{64} = \cdot 0491 (D^4 - d^4)$
	$\frac{B.D^3}{3}$		$\frac{B.D^3}{36}$
	$\frac{B(D^3 - d^3)}{12}$		$\frac{B.D^3}{12}$
	$\frac{\pi . D^4}{64} = \cdot 0491\ D^4$		$\frac{B.D^3}{4}$

AREAS OF SMALL CIRCLES, ADVANCING BY 32NDS OF AN INCH.

Diameter in inches	Area in square inches	Diameter in inches	Area in square inches	Diameter in inches	Area in square inches	Diameter in inches	Area in square inches
.. 1/32	·0008	.. 9/32	·0621	.. 17/32	·2217	.. 25/32	·4794
1/16 ..	·0031	5/16 ..	·0767	9/16 ..	·2485	13/16 ..	·5185
.. 3/32	·0069	.. 11/32	·0928	.. 19/32	·2769	.. 27/32	·5591
1/8 ..	·0123	3/8 ..	·1104	5/8 ..	·3068	7/8 ..	·6013
.. 5/32	·0192	.. 13/32	·1296	.. 21/32	·3382	.. 29/32	·6450
3/16 ..	·0276	7/16 ..	·1503	11/16 ..	·3712	15/16 ..	·6903
.. 7/32	·0376	.. 15/32	·1726	.. 23/32	·4057	.. 31/32	·7371
1/4 ..	·0491	1/2 ..	·1963	3/4 ..	·4418	1 ..	·7854

AREAS OF CIRCLES ADVANCING BY EIGHTHS.

Diameter	0	⅛	¼	⅜	½	⅝	¾	⅞
0	..	·012	·049	·110	·196	·307	·442	·601
1	·785	·994	1·227	1·485	1·767	2·074	2·405	2·761
2	3·142	3·547	3·976	4·430	4·909	5·412	5·940	6·492
3	7·069	7·670	8·296	8·946	9·621	10·321	11·045	11·793
4	12·566	13·364	14·186	15·033	15·904	16·800	17·721	18·665
5	19·635	20·629	21·648	22·691	23·758	24·850	25·967	27·109
6	28·274	29·465	30·680	31·919	33·183	34·472	35·785	37·122
7	38·485	39·871	41·282	42·718	44·179	45·664	47·173	48·707
8	50·265	51·849	53·456	55·088	56·745	58·426	60·132	61·862
9	63·617	65·397	67·201	69·029	70·882	72·760	74·662	76·589
10	78·540	80·516	82·516	84·541	86·590	88·664	90·763	92·886
11	95·033	97·205	99·402	101·62	103·87	106·14	108·43	110·75
12	113·10	115·47	117·86	120·28	122·72	125·19	127·68	130·19
13	132·73	135·30	137·89	140·50	143·14	145·80	148·49	151·20
14	153·94	156·70	159·48	162·30	165·13	167·99	170·87	173·78
15	176·71	179·67	182·65	185·66	188·69	191·75	194·83	197·93
16	201·06	204·22	207·39	210·60	213·82	217·08	220·35	223·65
17	226·98	230·33	233·71	237·10	240·53	243·98	247·45	250·95
18	254·47	258·02	261·59	265·18	268·80	272·45	276·12	279·81
19	283·53	287·27	291·04	294·83	298·65	302·49	306·35	310·24
20	314·16	318·10	322·06	326·05	330·06	334·10	338·16	342·25
21	346·36	350·50	354·66	358·84	363·05	367·28	371·54	375·83
22	380·13	384·46	388·82	393·20	397·61	402·04	406·49	410·97
23	415·48	420·00	424·56	429·13	433·74	438·36	443·01	447·69
24	452·39	457·11	461·86	466·64	471·44	476·26	481·11	485·98
25	490·87	495·79	500·74	505·71	510·71	515·72	520·77	525·84
26	530·93	536·05	541·19	546·35	551·55	556·76	562·00	567·27
27	572·56	577·87	583·21	588·57	593·96	599·37	604·81	610·27
28	615·75	621·26	626·80	632·36	637·94	643·55	649·18	654·84
29	660·52	666·23	671·96	677·71	683·49	689·30	695·13	700·98
30	706·86	712·76	718·69	724·64	730·62	736·62	742·64	748·69
31	754·77	760·87	766·99	773·14	779·31	785·51	791·73	797·98
32	804·25	810·54	816·86	823·21	829·58	835·97	842·39	848·83
33	855·30	861·79	868·31	874·85	881·41	888·00	894·62	901·26
34	907·92	914·61	921·32	928·06	934·82	941·61	948·42	955·25
35	962·11	969·00	975·91	982·84	989·80	996·78	1003·8	1010·8
36	1017·9	1025·0	1032·1	1039·2	1046·3	1053·5	1060·7	1068·0
37	1075·2	1082·5	1089·8	1097·1	1104·5	1111·8	1119·2	1126·7
38	1134·1	1141·6	1149·1	1156·6	1164·2	1171·7	1179·3	1186·9
39	1194·6	1202·3	1210·0	1217·7	1225·4	1233·2	1241·0	1248·8
40	1256·6	1264·5	1272·4	1280·3	1288·2	1296·2	1304·2	1312·2
41	1320·3	1328·3	1336·4	1344·5	1352·7	1360·8	1369·0	1377·2
42	1385·4	1393·7	1402·0	1410·3	1418·6	1427·0	1435·4	1443·8
43	1452·2	1460·7	1469·1	1477·6	1486·2	1494·7	1503·3	1511·9
44	1520·5	1529·2	1537·9	1546·6	1555·3	1564·0	1572·8	1581·6
45	1590·4	1599·3	1608·2	1617·0	1626·0	1634·9	1643·9	1652·9
46	1661·9	1670·9	1680·0	1689·1	1698·2	1707·4	1716·5	1725·7
47	1734·9	1744·2	1753·5	1762·7	1772·1	1781·4	1790·8	1800·1
48	1809·6	1819·0	1828·5	1837·9	1847·5	1857·0	1866·5	1876·1
49	1885·7	1895·4	1905·0	1914·7	1924·4	1934·2	1943·9	1953·7
50	1963·5	1973·3	1983·2	1993·1	2003·0	2012·9	2022·8	2032·8

AREAS OF CIRCLES ADVANCING BY EIGHTHS.

Diameter	0	⅛	¼	⅜	½	⅝	¾	⅞
51	2042·8	2052·8	2062·9	2073·0	2083·1	2093·2	2103·3	2113·5
52	2123·7	2133·9	2144·2	2154·5	2164·8	2175·1	2185·4	2195·8
53	2206·2	2216·6	2227·0	2237·5	2248·0	2258·5	2269·1	2279·6
54	2290·2	2300·8	2311·5	2322·1	2332·8	2343·5	2354·3	2365·0
55	2375·8	2386·6	2397·5	2408·3	2419·2	2430·1	2441·1	2452·0
56	2463·0	2474·0	2485·0	2496·1	2507·2	2518·3	2529·4	2540·6
57	2551·8	2563·0	2574·2	2585·4	2596·7	2608·0	2619·4	2630·7
58	2642·1	2653·5	2664·9	2676·4	2687·8	2699·3	2710·9	2722·4
59	2734·0	2745·6	2757·2	2768·8	2780·5	2792·2	2803·9	2815·7
60	2827·4	2839·2	2851·0	2862·9	2874·8	2886·6	2898·6	2910·5
61	2922·5	2934·5	2946·5	2958·5	2970·6	2982·7	2994·8	3006·9
62	3019·1	3031·3	3043·5	3055·7	3068·0	3080·3	3092·6	3104·9
63	3117·2	3129·6	3142·0	3154·5	3166·9	3179·4	3191·9	3204·4
64	3217·0	3229·6	3242·2	3254·8	3267·5	3280·1	3292·8	3305·6
65	3318·3	3331·1	3343·9	3356·7	3369·6	3382·4	3395·3	3408·2
66	3421·2	3434·2	3447·2	3460·2	3473·2	3486·3	3499·4	3512·5
67	3525·7	3538·8	3552·0	3565·2	3578·5	3591·7	3605·0	3618·3
68	3631·7	3645·0	3658·4	3671·8	3685·3	3698·7	3712·2	3725·7
69	3739·3	3752·8	3766·4	3780·0	3793·7	3807·3	3821·0	3834·7
70	3848·5	3862·2	3876·0	3889·8	3903·6	3917·5	3931·4	3945·3
71	3959·2	3973·1	3987·1	4001·1	4015·2	4029·2	4043·3	4057·4
72	4071·5	4085·7	4099·8	4114·0	4128·2	4142·5	4156·8	4171·1
73	4185·4	4199·7	4214·1	4228·5	4242·9	4257·4	4271·8	4286·3
74	4300·8	4315·4	4329·9	4344·5	4359·2	4373·8	4388·5	4403·2
75	4417·9	4432·6	4447·4	4462·2	4477·0	4491·8	4506·7	4521·5
76	4536·5	4551·4	4566·4	4581·3	4596·3	4611·4	4626·4	4641·5
77	4656·6	4671·8	4686·9	4702·1	4717·3	4732·5	4747·8	4763·1
78	4778·4	4793·7	4809·0	4824·4	4839·8	4855·2	4870·7	4886·2
79	4901·7	4917·2	4932·7	4948·3	4963·9	4979·5	4995·2	5010·9
80	5026·5	5042·3	5058·0	5073·8	5089·6	5105·4	5121·2	5137·1
81	5153·0	5168·9	5184·9	5200·8	5216·8	5232·8	5248·9	5264·9
82	5281·0	5297·1	5313·3	5329·4	5345·6	5361·8	5378·1	5394·3
83	5410·6	5426·9	5443·3	5459·6	5476·0	5492·4	5508·8	5525·3
84	5541·8	5558·3	5574·8	5591·4	5607·9	5624·5	5641·2	5657·8
85	5674·5	5691·2	5707·9	5724·7	5741·5	5758·3	5775·1	5791·9
86	5808·8	5825·7	5842·6	5895·6	5876·5	5893·5	5910·6	5927·6
87	5944·7	5961·8	5978·9	5996·0	6013·2	6030·4	6047·6	6064·9
88	6082·1	6099·4	6116·7	6134·1	6151·4	6168·8	6186·2	6203·7
89	6221·1	6238·6	6256·1	6273·7	6291·2	6308·8	6326·4	6344·1
90	6361·7	6379·4	6397·1	6414·9	6432·6	6450·4	6468·2	6486·0
91	6503·9	6521·8	6539·7	6557·6	6575·5	6593·5	6611·5	6629·6
92	6647·6	6665·7	6683·8	6701·9	6720·1	6738·2	6756·4	6774·7
93	6792·9	6811·2	6829·5	6847·8	6866·1	6884·5	6902·9	6921·3
94	6939·8	6958·2	6976·7	6995·3	7013·8	7032·4	7051·0	7069·6
95	7088·2	7106·9	7125·6	7144·3	7163·0	7181·8	7200·6	7219·4
96	7238·2	7257·1	7276·0	7294·9	7313·8	7332·8	7351·8	7370·8
97	7389·8	7408·9	7428·0	7447·1	7466·2	7485·3	7504·5	7523·7
98	7543·0	7562·2	7581·5	7600·8	7620·1	7639·5	7658·9	7678·3
99	7697·7	7717·1	7736·6	7756·1	7775·6	7795·2	7814·8	7834·4
100	7854·0	7873·6	7893·3	7913·0	7932·7	7952·5	7972·2	7992·0

CIRCUMFERENCES OF CIRCLES ADVANCING BY EIGHTHS.

Diameter	0	⅛	¼	⅜	½	⅝	¾	⅞
0	··	·393	·785	1·178	1·571	1·963	2·356	2·749
1	3·142	3·534	3·927	4·320	4·712	5·105	5·498	5·890
2	6·283	6·676	7·069	7·461	7·854	8·247	8·639	9·032
3	9·425	9·817	10·210	10·603	10·996	11·388	11·781	12·174
4	12·566	12·959	13·352	13·744	14·137	14·530	14·923	15·315
5	15·708	16·101	16·493	16·886	17·279	17·671	18·064	18·457
6	18·850	19·242	19·635	20·028	20·420	20·813	21·206	21·598
7	21·991	22·384	22·777	23·169	23·562	23·955	24·347	24·740
8	25·133	25·525	25·918	26·311	26·704	27·096	27·489	27·882
9	28·274	28·667	29·060	29·452	29·845	30·238	30·631	31·023
10	31·416	31·809	32·201	32·594	32·987	33·379	33·772	34·165
11	34·558	34·950	35·343	35·736	36·128	36·521	36·914	37·306
12	37·699	38·092	38·485	38·877	39·270	39·663	40·055	40·448
13	40·841	41·233	41·626	42·019	42·412	42·804	43·197	43·590
14	43·982	44·375	44·768	45·160	45·553	45·946	46·338	46·731
15	47·124	47·517	47·909	48·302	48·695	49·087	49·480	49·873
16	50·265	50·658	51·051	51·444	51·836	52·229	52·622	53·014
17	53·407	53·800	54·192	54·585	54·978	55·371	55·763	56·156
18	56·549	56·941	57·334	57·727	58·119	58·512	58·905	59·298
19	59·690	60·083	60·476	60·868	61·261	61·654	62·046	62·439
20	62·832	63·225	63·617	64·010	64·403	64·795	65·188	65·581
21	65·973	66·366	66·759	67·152	67·544	67·937	68·330	68·722
22	69·115	69·508	69·900	70·293	70·686	71·079	71·471	71·864
23	72·257	72·649	73·042	73·435	73·827	74·220	74·613	75·006
24	75·398	75·791	76·184	76·576	76·969	77·362	77·754	78·147
25	78·540	78·933	79·325	79·718	80·111	80·503	80·896	81·289
26	81·681	82·074	82·467	82·860	83·252	83·645	84·038	84·430
27	84·823	85·216	85·608	86·001	86·394	86·786	87·179	87·572
28	87·965	88·357	88·750	89·143	89·535	89·928	90·321	90·713
29	91·106	91·499	91·892	92·284	92·677	93·070	93·462	93·855
30	94·248	94·640	95·033	95·426	95·819	96·211	96·604	96·997
31	97·389	97·782	98·175	98·567	98·960	99·353	99·746	100·14
32	100·53	100·92	101·32	101·71	102·10	102·49	102·89	103·28
33	103·67	104·07	104·46	104·85	105·24	105·64	106·03	106·42
34	106·81	107·21	107·60	107·99	108·38	108·78	109·17	109·56
35	109·96	110·35	110·74	111·13	111·53	111·92	112·31	112·70
36	113·10	113·49	113·88	114·28	114·67	115·06	115·45	115·85
37	116·24	116·63	117·02	117·42	117·81	118·20	118·60	118·99
38	119·38	119·77	120·17	120·56	120·95	121·34	121·74	122·13
39	122·52	122·91	123·31	123·70	124·09	124·49	124·88	125·27
40	125·66	126·06	126·45	126·84	127·23	127·63	128·02	128·41
41	128·81	129·20	129·59	129·98	130·38	130·77	131·16	131·55
42	131·95	132·34	132·73	133·12	133·52	133·91	134·30	134·70
43	135·09	135·48	135·87	136·27	136·66	137·05	137·44	137·84
44	138·23	138·62	139·02	139·41	139·80	140·19	140·59	140·98
45	141·37	141·76	142·16	142·55	142·94	143·34	143·73	144·12
46	144·51	144·91	145·30	145·69	146·08	146·48	146·87	147·26
47	147·65	148·05	148·44	148·83	149·23	149·62	150·01	150·40
48	150·80	151·19	151·58	151·97	152·37	152·76	153·15	153·55
49	153·94	154·33	154·72	155·12	155·51	155·90	156·29	156·69
50	157·08	157·47	157·85	158·26	158·65	159·04	159·44	159·83

CIRCUMFERENCES OF CIRCLES ADVANCING BY EIGHTHS.

Diameter	0	⅛	¼	⅜	½	⅝	¾	⅞
51	160·22	160·61	161·01	161·40	161·79	162·18	162·58	162·97
52	163·36	163·76	164·15	164·54	164·93	165·33	165·72	166·11
53	166·50	166·90	167·29	167·68	168·08	168·47	168·86	169·25
54	169·65	170·04	170·43	170·82	171·22	171·61	172·00	172·39
55	172·79	173·18	173·57	173·97	174·36	174·75	175·14	175·54
56	175·93	176·32	176·71	177·11	177·50	177·89	178·29	178·68
57	179·07	179·46	179·86	180·25	180·64	181·03	181·43	181·82
58	182·21	182·61	183·00	183·39	183·78	184·18	184·57	184·96
59	185·35	185·75	186·14	186·53	186·92	187·32	187·71	188·10
60	188·50	188·89	189·28	189·67	190·07	190·46	190·85	191·24
61	191·64	192·03	192·42	192·82	193·21	193·60	193·99	194·39
62	194·78	195·17	195·56	195·96	196·35	196·74	197·13	197·53
63	197·92	198·31	198·71	199·10	199·49	199·88	200·28	200·67
64	201·06	201·45	201·85	202·24	202·63	203·03	203·42	203·81
65	204·20	204·60	204·99	205·38	205·77	206·17	206·56	206·95
66	207·35	207·74	208·13	208·52	208·92	209·31	209·70	210·09
67	210·49	210·88	211·27	211·66	212·06	212·45	212·84	213·24
68	213·63	214·02	214·41	214·81	215·20	215·59	215·98	216·38
69	216·77	217·16	217·56	217·95	218·34	218·73	219·13	219·52
70	219·91	220·30	220·70	221·09	221·48	221·87	222·27	222·66
71	223·05	223·45	223·84	224·23	224·62	225·02	225·41	225·80
72	226·19	226·59	226·98	227·37	227·77	228·16	228·55	228·94
73	229·34	229·73	230·12	230·51	230·91	231·30	231·69	232·09
74	232·48	232·87	233·26	233·66	234·05	234·44	234·83	235·23
75	235·62	236·01	236·40	236·80	237·19	237·58	237·98	238·37
76	238·76	239·15	239·55	239·94	240·33	240·72	241·12	241·51
77	241·90	242·30	242·69	243·08	243·47	243·87	244·26	244·65
78	245·04	245·44	245·83	246·22	246·62	247·01	247·40	247·79
79	248·19	248·58	248·97	249·36	249·76	250·15	250·54	250·93
80	251·33	251·72	252·11	252·51	252·90	253·29	253·68	254·08
81	254·47	254·86	255·25	255·65	256·04	256·43	256·83	257·22
82	257·61	258·00	258·40	258·79	259·18	259·57	259·97	260·36
83	260·75	261·14	261·54	261·93	262·32	262·72	263·11	263·50
84	263·89	264·29	264·68	265·07	265·46	265·86	266·25	266·64
85	267·04	267·43	267·82	268·21	268·61	269·00	269·39	269·78
86	270·18	270·57	270·96	271·36	271·75	272·14	272·53	272·93
87	273·32	273·71	274·10	274·50	274·89	275·28	275·67	276·07
88	276·46	276·85	277·25	277·64	278·03	278·42	278·82	279·21
89	279·60	279·99	280·39	280·78	281·17	281·57	281·96	282·35
90	282·74	283·14	283·53	283·92	284·31	284·71	285·10	285·49
91	285·88	286·28	286·67	287·06	287·46	287·85	288·24	288·63
92	289·03	289·42	289·81	290·20	290·60	290·99	291·38	291·78
93	292·17	292·56	292·95	293·35	293·74	294·13	294·52	294·92
94	295·31	295·70	296·10	296·49	296·88	297·27	297·67	298·06
95	298·45	298·84	299·24	299·63	300·02	300·41	300·81	301·20
96	301·59	301·99	302·38	302·77	303·16	303·56	303·95	304·34
97	304·73	305·13	305·52	305·91	306·31	306·70	307·09	307·48
98	307·88	308·27	308·66	309·05	309·45	309·84	310·23	310·62
99	311·02	311·41	311·80	312·20	312·59	312·98	313·37	313·77
100	314·16	314·55	314·94	315·34	315·73	316·12	316·52	316·91

SQUARES OF NUMBERS AND FRACTIONAL PARTS.

No.	0	⅛	¼	⅜	½	⅝	¾	⅞
0	..	·0156	·0625	·1406	·2500	·3906	·5625	·7656
1	1	1·2656	1·5625	1·8906	2·2500	2·6406	3·0625	3·5156
2	4	4·5156	5·0625	5·6406	6·2500	6·8906	7·5625	8·2656
3	9	9·7656	10·5625	11·3906	12·2500	13·1406	14·0625	15·0156
4	16	17·0156	18·0625	19·1406	20·2500	21·3906	22·5625	23·7656
5	25	26·2656	27·5625	28·8906	30·2500	31·6406	33·0625	34·5156
6	36	37·5156	39·0625	40·6406	42·2500	43·8906	45·5625	47·2656
7	49	50·7656	52·5625	54·3906	56·2500	58·1406	60·0625	62·0156
8	64	66·0156	68·0625	70·1406	72·2500	74·3906	76·5625	78·7656
9	81	83·2656	85·5625	87·8906	90·2500	92·6406	95·0625	97·5156
10	100	102·5156	105·0625	107·6406	110·2500	112·8906	115·5625	118·2656
11	121	123·7656	126·5625	129·3906	132·2500	135·1406	138·0625	141·0156
12	144	147·0156	150·0625	153·1406	156·2500	159·3906	162·5625	165·7656
13	169	172·2656	175·5625	178·8906	182·2500	185·6406	189·0625	192·5156
14	196	199·5156	203·0625	206·6406	210·2500	213·8906	217·5625	221·2656
15	225	228·7656	232·5625	236·3906	240·2500	244·1406	248·0625	252·0156
16	256	260·0156	264·0625	268·1406	272·2500	276·3906	280·5625	284·7656
17	289	293·2656	297·5625	301·8906	306·2500	310·6406	315·0625	319·5156
18	324	328·5156	333·0625	337·6406	342·2500	346·8906	351·5625	356·2656
19	361	365·7656	370·5625	375·3906	380·2500	385·1406	390·0625	395·0156
20	400	405·0156	410·0625	415·1406	420·2500	425·3906	430·5625	435·7656
21	441	446·2656	451·5625	456·8906	462·2500	467·6406	473·0625	478·5156
22	484	489·5156	495·0625	500·6406	506·2500	511·8906	517·5625	523·2656
23	529	534·7656	540·5625	546·3906	552·2500	558·1406	564·0625	570·0156
24	576	582·0156	588·0625	594·1406	600·2500	606·3906	612·5625	618·7656
25	625	631·2656	637·5625	643·8906	650·2500	656·6406	663·0625	669·5156
26	676	682·5156	689·0625	695·6406	702·2500	708·8906	715·5625	722·2656
27	729	735·7656	742·5625	749·3906	756·2500	763·1406	770·0625	777·0156
28	784	791·0156	798·0625	805·1406	812·2500	819·3906	826·5625	833·7656
29	841	848·2656	855·5625	862·8906	870·2500	877·6406	885·0625	892·5156
30	900	907·5156	915·0625	922·6406	930·2500	937·8906	945·5625	953·2656

SQUARES OF NUMBERS AND FRACTIONAL PARTS.

No.	0	⅛	¼	⅜	½	⅝	¾	⅞
31	961	968·7656	976·5625	984·3906	992·2500	1000·1406	1008·0625	1016·0156
32	1024	1032·0156	1040·0625	1048·1406	1056·2500	1064·3906	1072·5625	1080·7656
33	1089	1097·2656	1105·5625	1113·8906	1122·2500	1130·6406	1139·0625	1147·5156
34	1156	1164·5156	1173·0625	1181·6406	1190·2500	1198·8906	1207·5625	1216·2656
35	1225	1233·7656	1242·5625	1251·3906	1260·2500	1269·1406	1278·0625	1287·0156
36	1296	1305·0156	1314·0625	1323·1406	1332·2500	1341·3906	1350·5625	1359·7656
37	1369	1378·2656	1387·5625	1396·8906	1406·2500	1415·6406	1425·0625	1434·5156
38	1444	1453·5156	1463·0625	1472·6406	1482·2500	1491·8906	1501·5625	1511·2656
39	1521	1530·7656	1540·5625	1550·3906	1560·2500	1570·1406	1580·0625	1590·0156
40	1600	1610·0156	1620·0625	1630·1406	1640·2500	1650·3906	1660·5625	1670·7656
41	1681	1691·2656	1701·5625	1711·8906	1722·2500	1732·6406	1743·0625	1753·5156
42	1764	1774·5156	1785·0625	1795·6406	1806·2500	1816·8906	1827·5625	1838·2656
43	1849	1859·7656	1870·5625	1881·3906	1892·2500	1903·1406	1914·0625	1925·0156
44	1936	1947·0156	1958·0625	1969·1406	1980·2500	1991·3906	2002·5625	2013·7656
45	2025	2036·2656	2047·5625	2058·8906	2070·2500	2081·6406	2093·0625	2104·5156
46	2116	2127·5156	2139·0625	2150·6406	2162·2500	2173·8906	2185·5625	2197·2656
47	2209	2220·7656	2232·5625	2244·3906	2256·2500	2268·1406	2280·0625	2292·0156
48	2304	2316·0156	2328·0625	2340·1406	2352·2500	2364·3906	2376·5625	2388·7656
49	2401	2413·2656	2425·5625	2437·8906	2450·2500	2462·6406	2475·0625	2487·5156
50	2500	2512·5156	2525·0625	2537·6406	2550·2500	2562·8906	2575·5625	2588·2656
51	2601	2613·7656	2626·5625	2639·3906	2652·2500	2665·1406	2678·0625	2691·0156
52	2704	2717·0156	2730·0625	2743·1406	2756·2500	2769·3906	2782·5625	2795·7656
53	2809	2822·2656	2835·5625	2848·8906	2862·2500	2875·6406	2889·0625	2902·5156
54	2916	2929·5156	2943·0625	2956·6406	2970·2500	2983·8906	2997·5625	3011·2656
55	3025	3038·7656	3052·5625	3066·3906	3080·2500	3094·1406	3108·0625	3122·0156
56	3136	3150·0156	3164·0625	3178·1406	3192·2500	3206·3906	3220·5625	3234·7656
57	3249	3263·2656	3277·5625	3291·8906	3306·2500	3320·6406	3335·0625	3349·5156
58	3364	3378·5156	3393·0625	3407·6406	3422·2500	3436·8906	3451·5625	3466·2656
59	3481	3495·7656	3510·5625	3525·3906	3540·2500	3555·1406	3570·0625	3585·0156
60	3600	3615·0156	3630·0625	3645·1406	3660·2500	3675·3906	3690·5625	3705·7656

CUBES OF NUMBERS AND FRACTIONAL PARTS.

No.	0	⅛	¼	⅜	½	⅝	¾	⅞
0	..	·002	·016	·053	·125	·244	·422	·670
1	1	1·424	1·953	2·600	3·375	4·291	5·359	6·592
2	8	9·596	11·391	13·396	15·625	18·088	20·797	23·764
3	27	30·518	34·328	38·443	42·875	47·635	52·734	58·186
4	64	70·189	76·766	83·740	91·125	98·932	107·172	115·857
5	125	134·611	144·703	155·287	166·375	177·979	190·109	202·779
6	216	229·783	244·141	259·084	274·625	290·775	307·547	324·951
7	343	361·705	381·078	401·131	421·875	443·322	465·484	488·373
8	512	536·377	561·516	587·428	614·125	641·619	669·922	699·045
9	729	759·799	791·453	823·975	857·375	891·666	926·859	962·967
10	1000	1037·971	1076·891	1116·771	1157·625	1199·463	1242·297	1286·139
11	1331	1376·893	1423·828	1471·818	1520·875	1571·010	1622·234	1674·561
12	1728	1782·564	1838·266	1895·115	1953·125	2012·307	2072·672	2134·232
13	2197	2260·986	2326·203	2392·662	2460·375	2529·354	2599·609	2671·154
14	2744	2818·158	2893·641	2970·459	3048·625	3128·150	3209·047	3291·326
15	3375	3460·080	3546·578	3634·506	3723·875	3814·697	3906·984	4000·748
16	4096	4192·752	4291·016	4390·803	4492·125	4594·994	4699·422	4805·420
17	4913	5022·174	5132·953	5245·350	5359·375	5475·041	5592·359	5711·342
18	5832	5954·346	6078·391	6204·146	6331·625	6460·838	6591·797	6724·514
19	6859	6995·268	7133·328	7273·193	7414·875	7558·385	7703·734	7850·936
20	8000	8150·939	8303·766	8458·490	8615·125	8773·682	8934·172	9096·607
21	9261	9427·361	9595·703	9766·037	9938·375	10112·729	10289·109	10467·529
22	10648	10830·533	11015·141	11201·834	11390·625	11581·525	11774·547	11969·701
23	12167	12366·455	12568·078	12771·881	12977·875	13186·072	13396·484	13609·123
24	13824	14041·127	14260·516	14482·178	14706·125	14932·369	15160·922	15391·795
25	15625	15860·549	16098·453	16338·725	16581·375	16826·416	17073·859	17323·717
26	17576	17830·721	18087·891	18347·521	18609·625	18874·213	19141·297	19410·889
27	19683	19957·643	20234·828	20514·568	20796·875	21081·760	21369·234	21659·311
28	21952	22247·315	22545·266	22845·865	23149·125	23455·057	23763·672	24074·982
29	24389	24705·736	25025·203	25347·412	25672·375	26000·104	26330·609	26663·904
30	27000	27338·903	27680·641	28025·209	28372·625	28722·900	29076·047	29432·076

CUBES OF NUMBERS AND FRACTIONAL PARTS.

No.	0	1/8	1/4	3/8	1/2	5/8	3/4	7/8
31	29791	30152·83	30517·58	30885·26	31255·87	31629·45	32005·98	32385·50
32	32768	33153·50	33542·02	33933·55	34328·12	34725·74	35126·42	35530·17
33	35937	36346·92	36759·95	37176·10	37595·37	38017·79	38443·36	38872·09
34	39304	39739·10	40177·39	40618·90	41063·62	41511·59	41962·80	42417·26
35	42875	43336·02	43800·33	44267·94	44738·87	45213·13	45690·73	46171·69
36	46656	47143·69	47634·77	48129·24	48627·12	49128·43	49633·17	50141·36
37	50653	51168·11	51686·70	52208·79	52734·37	53263·48	53796·11	54332·28
38	54872	55415·28	55962·14	56512·58	57066·62	57624·23	58185·55	58750·45
39	59319	59891·21	60467·08	61046·63	61629·87	62216·82	62807·48	63401·87
40	64000	64601·88	65207·52	65816·93	66430·12	67047·12	67667·92	68292·54
41	68921	69553·30	70189·45	70829·47	71473·37	72121·17	72772·86	73428·47
42	74088	74751·47	75418·89	76090·27	76765·62	77444·96	78128·30	78815·64
43	79507	80202·39	80901·83	81605·32	82312·87	83024·51	83740·23	84460·06
44	85184	85912·06	86644·27	87380·62	88121·12	88865·81	89614·67	90367·73
45	91125	91886·49	92652·20	93422·16	94196·37	94974·85	95757·61	96544·65
46	97336	98131·66	98931·64	99735·96	100544·62	101357·65	102175·05	102996·83
47	103823	104653·58	105488·58	106328·01	107171·87	108020·20	108872·98	109730·25
48	110592	111458·25	112329·02	113204·30	114084·12	114968·49	115857·42	116750·92
49	117649	118551·67	119458·95	120370·85	121287·37	122208·54	123134·36	124064·84
50	125000	125939·85	126884·39	127833·65	128787·62	129746·34	130709·80	131678·01
51	132651	133628·77	134611·33	135593·69	136590·87	137587·88	138539·73	139596·44
52	140608	141624·44	142645·77	143671·99	144703·12	145739·18	146780·17	147826·11
53	148877	149932·86	150993·70	152059·54	153130·37	154206·23	155287·11	156373·03
54	157464	158560·03	159661·14	160767·33	161878·62	162995·03	164116·55	165243·20
55	166375	167511·96	168654·08	169801·38	170953·87	172111·57	173274·48	174442·62
56	175616	176794·63	177978·52	179167·68	180362·12	181561·87	182766·92	183977·29
57	185193	186414·05	187640·45	188872·22	190109·37	191351·92	192599·86	193853·22
58	195112	196376·22	197645·89	198921·02	200201·62	201487·71	202779·30	204076·39
59	205379	206687·14	208000·83	209320·07	210644·87	211975·26	213311·23	214652·81
60	216000	217352·81	218711·27	220075·37	221445·12	222820·56	224201·67	225588·48

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, NOS. FROM 1 TO 1,000.

No.	Square	Cube	Square Root $\sqrt{\ }$	Cube Root $\sqrt[3]{\ }$	No.	Square	Cube	Square Root $\sqrt{\ }$	Cube Root $\sqrt[3]{\ }$
					50	2500	125000	7·0711	3·6840
1	1	1	1·0000	1·0000	51	2601	132651	7·1414	3·7084
2	4	8	1·4142	1·2599	52	2704	140608	7·2111	3·7325
3	9	27	1·7321	1·4422	53	2809	148877	7·2801	3·7563
4	16	64	2·0000	1·5874	54	2916	157464	7·3485	3·7798
5	25	125	2·2361	1·7100	55	3025	166375	7·4162	3·8030
6	36	216	2·4495	1·8171	56	3136	175616	7·4833	3·8259
7	49	343	2·6458	1·9129	57	3249	185193	7·5498	3·8485
8	64	512	2·8284	2·0000	58	3364	195112	7·6158	3·8709
9	81	729	3·0000	2·0801	59	3481	205379	7·6811	3·8930
10	100	1000	3·1623	2·1544	60	3600	216000	7·7460	3·9149
11	121	1331	3·3166	2·2240	61	3721	226981	7·8102	3·9365
12	144	1728	3·4641	2·2894	62	3844	238328	7·8740	3·9579
13	169	2197	3·6056	2·3513	63	3969	250047	7·9373	3·9791
14	196	2744	3·7417	2·4101	64	4096	262144	8·0000	4·0000
15	225	3375	3·8730	2·4662	65	4225	274625	8·0623	4·0207
16	256	4096	4·0000	2·5198	66	4356	287496	8·1240	4·0412
17	289	4913	4·1231	2·5713	67	4489	300763	8·1854	4·0615
18	324	5832	4·2426	2·6207	68	4624	314432	8·2462	4·0817
19	361	6859	4·3589	2·6684	69	4761	328509	8·3066	4·1016
20	400	8000	4·4721	2·7144	70	4900	343000	8·3666	4·1213
21	441	9261	4·5826	2·7589	71	5041	357911	8·4261	4·1408
22	484	10648	4·6904	2·8020	72	5184	373248	8·4853	4·1602
23	529	12167	4·7958	2·8439	73	5329	389017	8·5440	4·1793
24	576	13824	4·8990	2·8845	74	5476	405224	8·6023	4·1983
25	625	15625	5·0000	2·9240	75	5625	421875	8·6603	4·2172
26	676	17576	5·0990	2·9625	76	5776	438976	8·7178	4·2358
27	729	19683	5·1962	3·0000	77	5929	456533	8·7750	4·2543
28	784	21952	5·2915	3·0366	78	6084	474552	8·8318	4·2727
29	841	24389	5·3852	3·0723	79	6241	493039	8·8882	4·2908
30	900	27000	5·4772	3·1072	80	6400	512000	8·9443	4·3089
31	961	29791	5·5678	3·1414	81	6561	531441	9·0000	4·3267
32	1024	32768	5·6569	3·1748	82	6724	551368	9·0554	4·3445
33	1089	35937	5·7446	3·2075	83	6889	571787	9·1104	4·3621
34	1156	39304	5·8310	3·2396	84	7056	592704	9·1652	4·3795
35	1225	42875	5·9161	3·2711	85	7225	614125	9·2195	4·3968
36	1296	46656	6·0000	3·3019	86	7396	636056	9·2736	4·4140
37	1369	50653	6·0828	3·3322	87	7569	658503	9·3274	4·4310
38	1444	54872	6·1644	3·3620	88	7744	681472	9·3808	4·4480
39	1521	59319	6·2450	3·3912	89	7921	704969	9·4340	4·4647
40	1600	64000	6·3246	3·4200	90	8100	729000	9·4868	4·4814
41	1681	68921	6·4031	3·4482	91	8281	753571	9·5394	4·4979
42	1764	74088	6·4807	3·4760	92	8464	778688	9·5917	4·5144
43	1849	79507	6·5574	3·5034	93	8649	804357	9·6437	4·5307
44	1936	85184	6·6332	3·5303	94	8836	830584	9·6954	4·5468
45	2025	91125	6·7082	3·5569	95	9025	857375	9·7468	4·5629
46	2116	97336	6·7823	3·5830	96	9216	884736	9·7980	4·5789
47	2209	103823	6·8557	3·6088	97	9409	912673	9·8489	4·5947
48	2304	110592	6·9282	3·6342	98	9604	941192	9·8995	4·6104
49	2401	117649	7·0000	3·6593	99	9801	970299	9·9499	4·6261

DORMAN, LONG & CO. LIMITED.

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, NOS. FROM 1 TO 1,000.

No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$	No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$
100	10000	1000000	10·0000	4·6416	150	22500	3375000	12·2474	5·3133
101	10201	1030301	10·0499	4·6570	151	22801	3442951	12·2882	5·3251
102	10404	1061208	10·0995	4·6723	152	23104	3511808	12·3288	5·3368
103	10609	1092727	10·1489	4·6875	153	23409	3581577	12·3693	5·3485
104	10816	1124864	10·1980	4·7027	154	23716	3652264	12·4097	5·3601
105	11025	1157625	10·2470	4·7177	155	24025	3723875	12·4499	5·3717
106	11236	1191016	10·2956	4·7326	156	24336	3796416	12·4900	5·3832
107	11449	1225043	10·3441	4·7475	157	24649	3869893	12·5300	5·3947
108	11664	1259712	10·3923	4·7622	158	24964	3944312	12·5698	5·4061
109	11881	1295029	10·4403	4·7769	159	25281	4019679	12·6095	5·4175
110	12100	1331000	10·4881	4·7914	160	25600	4096000	12·6491	5·4288
111	12321	1367631	10·5357	4·8059	161	25921	4173281	12·6886	5·4401
112	12544	1404928	10·5830	4·8203	162	26244	4251528	12·7279	5·4514
113	12769	1442897	10·6301	4·8346	163	26569	4330747	12·7671	5·4626
114	12996	1481544	10·6771	4·8488	164	26896	4410944	12·8062	5·4737
115	13225	1520875	10·7238	4·8629	165	27225	4492125	12·8452	5·4848
116	13456	1560896	10·7703	4·8770	166	27556	4574296	12·8841	5·4959
117	13689	1601613	10·8167	4·8910	167	27889	4657463	12·9228	5·5069
118	13924	1643032	10·8628	4·9049	168	28224	4741632	12·9615	5·5178
119	14161	1685159	10·9087	4·9187	169	28561	4826809	13·0000	5·5288
120	14400	1728000	10·9545	4·9324	170	28900	4913000	13·0384	5·5397
121	14641	1771561	11·0000	4·9461	171	29241	5000211	13·0767	5·5505
122	14884	1815848	11·0454	4·9597	172	29584	5088448	13·1149	5·5613
123	15129	1860867	11·0905	4·9732	173	29929	5177717	13·1529	5·5721
124	15376	1906624	11·1355	4·9866	174	30276	5268024	13·1909	5·5828
125	15625	1953125	11·1803	5·0000	175	30625	5359375	13·2288	5·5934
126	15876	2000376	11·2250	5·0133	176	30976	5451776	13·2665	5·6041
127	16129	2048383	11·2694	5·0265	177	31329	5545233	13·3041	5·6147
128	16384	2097152	11·3137	5·0397	178	31684	5639752	13·3417	5·6252
129	16641	2146689	11·3578	5·0528	179	32041	5735339	13·3791	5·6357
130	16900	2197000	11·4018	5·0658	180	32400	5832000	13·4164	5·6462
131	17161	2248091	11·4455	5·0788	181	32761	5929741	13·4536	5·6567
132	17424	2299968	11·4891	5·0916	182	33124	6028568	13·4907	5·6671
133	17689	2352637	11·5326	5·1045	183	33489	6128487	13·5277	5·6774
134	17956	2406104	11·5758	5·1172	184	33856	6229504	13·5647	5·6877
135	18225	2460375	11·6190	5·1299	185	34225	6331625	13·6015	5·6980
136	18496	2515456	11·6619	5·1426	186	34596	6434856	13·6382	5·7083
137	18769	2571353	11·7047	5·1551	187	34969	6539203	13·6748	5·7185
138	19044	2628072	11·7473	5·1676	188	35344	6644672	13·7113	5·7287
139	19321	2685619	11·7898	5·1801	189	35721	6751269	13·7477	5·7388
140	19600	2744000	11·8322	5·1925	190	36100	6859000	13·7840	5·7489
141	19881	2803221	11·8743	5·2048	191	36481	6967871	13·8203	5·7590
142	20164	2863288	11·9164	5·2171	192	36864	7077888	13·8564	5·7690
143	20449	2924207	11·9583	5·2293	193	37249	7189057	13·8924	5·7790
144	20736	2985984	12·0000	5·2415	194	37636	7301384	13·9284	5·7890
145	21025	3048625	12·0416	5·2536	195	38025	7414875	13·9642	5·7989
146	21316	3112136	12·0830	5·2656	196	38416	7529536	14·0000	5·8088
147	21609	3176523	12·1244	5·2776	197	38809	7645373	14·0357	5·8186
148	21904	3241792	12·1655	5·2896	198	39204	7762392	14·0712	5·8285
149	22201	3307949	12·2066	5·3015	199	39601	7880599	14·1067	5·8383

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, NOS. FROM 1 TO 1,000.

No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$	No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$
200	40000	8000000	14·1421	5·8480	250	62500	15625000	15·8114	6·2996
201	40401	8120601	14·1774	5·8578	251	63001	15813251	15·8430	6·3080
202	40804	8242408	14·2127	5·8675	252	63504	16003008	15·8745	6·3164
203	41209	8365427	14·2478	5·8771	253	64009	16194277	15·9060	6·3247
204	41616	8489664	14·2829	5·8868	254	64516	16387064	15·9374	6·3330
205	42025	8615125	14·3178	5·8964	255	65025	16581375	15·9687	6·3413
206	42436	8741816	14·3527	5·9059	256	65536	16777216	16·0000	6·3496
207	42849	8869743	14·3875	5·9155	257	66049	16974593	16·0312	6·3579
208	43264	8998912	14·4222	5·9250	258	66564	17173512	16·0624	6·3661
209	43681	9129329	14·4568	5·9345	259	67081	17373979	16·0935	6·3743
210	44100	9261000	14·4914	5·9439	260	67600	17576000	16·1245	6·3825
211	44521	9393931	14·5258	5·9533	261	68121	17779581	16·1555	6·3907
212	44944	9528128	14·5602	5·9627	262	68644	17984728	16·1864	6·3988
213	45369	9663597	14·5945	5·9721	263	69169	18191447	16·2173	6·4070
214	45796	9800344	14·6287	5·9814	264	69696	18399744	16·2481	6·4151
215	46225	9938375	14·6629	5·9907	265	70225	18609625	16·2788	6·4232
216	46656	10077696	14·6969	6·0000	266	70756	18821096	16·3095	6·4312
217	47089	10218313	14·7309	6·0092	267	71289	19034163	16·3401	6·4393
218	47524	10360232	14·7648	6·0185	268	71824	19248832	16·3707	6·4473
219	47961	10503459	14·7986	6·0277	269	72361	19465109	16·4012	6·4553
220	48400	10648000	14·8324	6·0368	270	72900	19683000	16·4317	6·4633
221	48841	10793861	14·8661	6·0459	271	73441	19902511	16·4621	6·4713
222	49284	10941048	14·8997	6·0550	272	73984	20123648	16·4924	6·4792
223	49729	11089567	14·9332	6·0641	273	74529	20346417	16·5227	6·4872
224	50176	11239424	14·9666	6·0732	274	75076	20570824	16·5529	6·4951
225	50625	11390625	15·0000	6·0822	275	75625	20796875	16·5831	6·5030
226	51076	11543176	15·0333	6·0912	276	76176	21024576	16·6132	6·5108
227	51529	11697083	15·0665	6·1002	277	76729	21253933	16·6433	6·5187
228	51984	11852352	15·0997	6·1091	278	77284	21484952	16·6733	6·5265
229	52441	12008989	15·1327	6·1180	279	77841	21717639	16·7033	6·5343
230	52900	12167000	15·1658	6·1269	280	78400	21952000	16·7332	6·5421
231	53361	12326391	15·1987	6·1358	281	78961	22188041	16·7631	6·5499
232	53824	12487168	15·2315	6·1446	282	79524	22425768	16·7929	6·5577
233	54289	12649337	15·2643	6·1534	283	80089	22665187	16·8226	6·5654
234	54756	12812904	15·2971	6·1622	284	80656	22906304	16·8523	6·5731
235	55225	12977875	15·3297	6·1710	285	81225	23149125	16·8819	6·5808
236	55696	13144256	15·3623	6·1797	286	81796	23393656	16·9115	6·5885
237	56169	13312053	15·3948	6·1885	287	82369	23639903	16·9411	6·5962
238	56644	13481272	15·4272	6·1972	288	82944	23887872	16·9706	6·6039
239	57121	13651919	15·4596	6·2058	289	83521	24137569	17·0000	6·6115
240	57600	13824000	15·4919	6·2145	290	84100	24389000	17·0294	6·6191
241	58081	13997521	15·5242	6·2231	291	84681	24642171	17·0587	6·6267
242	58564	14172488	15·5563	6·2317	292	85264	24897088	17·0880	6·6343
243	59049	14348907	15·5885	6·2403	293	85849	25153757	17·1172	6·6419
244	59536	14526784	15·6205	6·2488	294	86436	25412184	17·1464	6·6494
245	60025	14706125	15·6525	6·2573	295	87025	25672375	17·1756	6·6569
246	60516	14886936	15·6844	6·2658	296	87616	25934336	17·2047	6·6644
247	61009	15069223	15·7162	6·2743	297	88209	26198073	17·2337	6·6719
248	61504	15252992	15·7480	6·2828	298	88804	26463592	17·2627	6·6794
249	62001	15438249	15·7797	6·2912	299	89401	26730899	17·2916	6·6869

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, NOS. FROM 1 TO 1,000.

No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$	No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$
300	90000	27000000	17·3205	6·6943	350	122500	42875000	18·7083	7·0473
301	90601	27270901	17·3494	6·7018	351	123201	43243551	18·7350	7·0540
302	91204	27543608	17·3781	6·7092	352	123904	43614208	18·7617	7·0607
303	91809	27818127	17·4069	6·7166	353	124609	43986977	18·7883	7·0674
304	92416	28094464	17·4356	6·7240	354	125316	44361864	18·8149	7·0740
305	93025	28372625	17·4642	6·7313	355	126025	44738875	18·8414	7·0807
306	93636	28652616	17·4929	6·7387	356	126736	45118016	18·8680	7·0873
307	94249	28934443	17·5214	6·7460	357	127449	45499293	18·8944	7·0940
308	94864	29218112	17·5499	6·7533	358	128164	45882712	18·9209	7·1006
309	95481	29503629	17·5784	6·7606	359	128881	46268279	18·9473	7·1072
310	96100	29791000	17·6068	6·7679	360	129600	46656000	18·9737	7·1138
311	96721	30080231	17·6352	6·7752	361	130321	47045881	19·0000	7·1204
312	97344	30371328	17·6635	6·7824	362	131044	47437928	19·0263	7·1269
313	97969	30664297	17·6918	6·7897	363	131769	47832147	19·0526	7·1335
314	98596	30959144	17·7200	6·7969	364	132496	48228544	19·0788	7·1400
315	99225	31255875	17·7482	6·8041	365	133225	48627125	19·1050	7·1466
316	99856	31554496	17·7764	6·8113	366	133956	49027896	19·1311	7·1531
317	100489	31855013	17·8045	6·8185	367	134689	49430863	19·1572	7·1596
318	101124	32157432	17·8326	6·8256	368	135424	49836032	19·1833	7·1661
319	101761	32461759	17·8606	6·8328	369	136161	50243409	19·2094	7·1726
320	102400	32768000	17·8885	6·8399	370	136900	50653000	19·2354	7·1791
321	103041	33076161	17·9165	6·8470	371	137641	51064811	19·2614	7·1855
322	103684	33386248	17·9444	6·8541	372	138384	51478848	19·2873	7·1920
323	104329	33698267	17·9722	6·8612	373	139129	51895117	19·3132	7·1984
324	104976	34012224	18·0000	6·8683	374	139876	52313624	19·3391	7·2048
325	105625	34328125	18·0278	6·8753	375	140625	52734375	19·3649	7·2112
326	106276	34645976	18·0555	6·8824	376	141376	53157376	19·3907	7·2177
327	106929	34965783	18·0831	6·8894	377	142129	53582633	19·4165	7·2240
328	107584	35287552	18·1108	6·8964	378	142884	54010152	19·4422	7·2304
329	108241	35611289	18·1384	6·9034	379	143641	54439939	19·4679	7·2368
330	108900	35937000	18·1659	6·9104	380	144400	54872000	19·4936	7·2432
331	109561	36264691	18·1934	6·9174	381	145161	55306341	19·5192	7·2495
332	110224	36594368	18·2209	6·9244	382	145924	55742968	19·5448	7·2558
333	110889	36926037	18·2483	6·9313	383	146689	56181887	19·5704	7 2622
334	111556	37259704	18·2757	6·9382	384	147456	56623104	19·5959	7 2685
335	112225	37595375	18·3030	6·9451	385	148225	57066625	19·6214	7·2748
336	112896	37933056	18·3303	6·9521	386	148996	57512456	19·6469	7·2811
337	113569	38272753	18·3576	6·9589	387	149769	57960603	19 6723	7·2874
338	114244	38614472	18·3848	6·9658	388	150544	58411072	19·6977	7·2936
339	114921	38958219	18·4120	6·9727	389	151321	58863869	19·7231	7·2999
340	115600	39304000	18·4391	6·9795	390	152100	59319000	19·7484	7·3061
341	116281	39651821	18·4662	6·9864	391	152881	59776471	19·7737	7·3124
342	116964	40001688	18·4932	6·9932	392	153664	60236288	19·7990	7·3186
343	117649	40353607	18·5203	7·0000	393	154449	60698457	19·8242	7·3248
344	118336	40707584	18·5472	7·0068	394	155236	61162984	19·8494	7·3310
345	119025	41063625	18·5742	7·0136	395	156025	61629875	19·8746	7·3372
346	119716	41421736	18·6011	7·0203	396	156816	62099136	19·8997	7·3434
347	120409	41781923	18·6279	7·0271	397	157609	62570773	19·9249	7·3496
348	121104	42144192	18·6548	7·0338	398	158404	63044792	19·9499	7·3558
349	121801	42508549	18·6815	7·0406	399	159201	63521199	19·9750	7·3619

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, NOS. FROM 1 TO 1,000.

No.	Square	Cube	Square Root √	Cube Root ∛	No.	Square	Cube	Square Root √	Cube Root ∛
400	160000	64000000	20·0000	7·3681	450	202500	91125000	21·2132	7·6631
401	160801	64481201	20·0250	7·3742	451	203401	91733851	21·2368	7·6688
402	161604	64964808	20·0499	7·3803	452	204304	92345408	21·2603	7·6744
403	162409	65450827	20·0749	7·3864	453	205209	92959677	21·2838	7·6801
404	163216	65939264	20·0998	7·3925	454	206116	93576664	21·3073	7·6857
405	164025	66430125	20·1246	7·3986	455	207025	94196375	21·3307	7·6914
406	164836	66923416	20·1494	7·4047	456	207936	94818816	21·3542	7·6970
407	165649	67419143	20·1742	7·4108	457	208849	95443993	21·3776	7·7026
408	166464	67917312	20·1990	7·4169	458	209764	96071912	21·4009	7·7082
409	167281	68417929	20·2237	7·4229	459	210681	96702579	21·4243	7·7138
410	168100	68921000	20·2485	7·4290	460	211600	97336000	21·4476	7·7194
411	168921	69426531	20·2731	7·4350	461	212521	97972181	21·4709	7·7250
412	169744	69934528	20·2978	7·4410	462	213444	98611128	21·4942	7·7306
413	170569	70444997	20·3224	7·4470	463	214369	99252847	21·5174	7·7362
414	171396	70957944	20·3470	7·4530	464	215296	99897344	21·5407	7·7418
415	172225	71473375	20·3715	7·4590	465	216225	100544625	21·5639	7·7473
416	173056	71991296	20·3961	7·4650	466	217156	101194696	21·5870	7·7529
417	173889	72511713	20·4206	7·4710	467	218089	101847563	21·6102	7·7584
418	174724	73034632	20·4450	7·4770	468	219024	102503232	21·6333	7·7639
419	175561	73560059	20·4695	7·4829	469	219961	103161709	21·6564	7·7695
420	176400	74088000	20·4939	7·4889	470	220900	103823000	21·6795	7·7750
421	177241	74618461	20·5183	7·4948	471	221841	104487111	21·7025	7·7805
422	178084	75151448	20·5426	7·5007	472	222784	105154048	21·7256	7·7860
423	178929	75686967	20·5670	7·5067	473	223729	105823817	21·7486	7·7915
424	179776	76225024	20·5913	7·5126	474	224676	106496424	21·7715	7·7970
425	180625	76765625	20·6155	7·5185	475	225625	107171875	21·7945	7·8025
426	181476	77308776	20·6398	7·5244	476	226576	107850176	21·8174	7·8079
427	182329	77854483	20·6640	7·5302	477	227529	108531333	21·8403	7·8134
428	183184	78402752	20·6882	7·5361	478	228484	109215352	21·8632	7·8188
429	184041	78953589	20·7123	7·5420	479	229441	109902239	21·8861	7·8243
430	184900	79507000	20·7364	7·5478	480	230400	110592000	21·9089	7·8297
431	185761	80062991	20·7605	7·5537	481	231361	111284641	21·9317	7·8352
432	186624	80621568	20·7846	7·5595	482	232324	111980168	21·9545	7·8406
433	187489	81182737	20·8087	7·5654	483	233289	112678587	21·9773	7·8460
434	188356	81746504	20·8327	7·5712	484	234256	113379904	22·0000	7·8514
435	189225	82312875	20·8567	7·5770	485	235225	114084125	22·0227	7·8568
436	190096	82881856	20·8806	7·5828	486	236196	114791256	22·0454	7·8622
437	190969	83453453	20·9045	7·5886	487	237169	115501303	22·0681	7·8676
438	191844	84027672	20·9284	7·5944	488	238144	116214272	22·0907	7·8730
439	192721	84604519	20·9523	7·6001	489	239121	116930169	22·1133	7·8784
440	193600	85184000	20·9762	7·6059	490	240100	117649000	22·1359	7·8837
441	194481	85766121	21·0000	7·6117	491	241081	118370771	22·1585	7·8891
442	195364	86350888	21·0238	7·6174	492	242064	119095488	22·1811	7·8944
443	196249	86938307	21·0476	7·6232	493	243049	119823157	22·2036	7·8998
444	197136	87528384	21·0713	7·6289	494	244036	120553784	22·2261	7·9051
445	198025	88121125	21·0950	7·6346	495	245025	121287375	22·2486	7·9105
446	198916	88716536	21·1187	7·6403	496	246016	122023936	22·2711	7·9158
447	199809	89314623	21·1424	7·6460	497	247009	122763473	22·2935	7·9211
448	200704	89915392	21·1660	7·6517	498	248004	123505992	22·3159	7·9264
449	201601	90518849	21·1896	7·6574	499	249001	124251499	22·3383	7·9317

DORMAN, LONG & CO. LIMITED.

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, NOS. FROM 1 TO 1,000.

No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$	No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$
500	250000	125000000	22·3607	7·9370	550	302500	166375000	23·4521	8·1932
501	251001	125751501	22·3830	7·9423	551	303601	167284151	23·4734	8·1982
502	252004	126506008	22·4054	7·9476	552	304704	168196608	23·4947	8·2031
503	253009	127263527	22·4277	7·9528	553	305809	169112377	23·5160	8·2081
504	254016	128024064	22·4499	7·9581	554	306916	170031464	23·5372	8·2130
505	255025	128787625	22·4722	7·9634	555	308025	170953875	23·5584	8·2180
506	256036	129554216	22·4944	7·9686	556	309136	171879616	23·5797	8·2229
507	257049	130323843	22·5167	7·9739	557	310249	172808693	23·6008	8·2278
508	258064	131096512	22·5389	7·9791	558	311364	173741112	23·6220	8·2327
509	259081	131872229	22·5610	7·9843	559	312481	174676879	23·6432	8·2377
510	260100	132651000	22·5832	7·9896	560	313600	175616000	23·6643	8·2426
511	261121	133432831	22·6053	7·9948	561	314721	176558481	23·6854	8·2475
512	262144	134217728	22·6274	8·0000	562	315844	177504328	23·7065	8·2524
513	263169	135005697	22·6495	8·0052	563	316969	178453547	23·7276	8·2573
514	264196	135796744	22·6716	8·0104	564	318096	179406144	23·7487	8·2621
515	265225	136590875	22·6936	8·0156	565	319225	180362125	23·7697	8·2670
516	266256	137388096	22·7156	8·0208	566	320356	181321496	23·7908	8·2719
517	267289	138188413	22·7376	8·0260	567	321489	182284263	23·8118	8·2768
518	268324	138991832	22·7596	8·0311	568	322624	183250432	23·8328	8·2816
519	269361	139798359	22·7816	8·0363	569	323761	184220009	23·8537	8·2865
520	270400	140608000	22·8035	8·0415	570	324900	185193000	23·8747	8·2913
521	271441	141420761	22·8254	8·0466	571	326041	186169411	23·8956	8·2962
522	272484	142236648	22·8473	8·0517	572	327184	187149248	23·9165	8·3010
523	273529	143055667	22·8692	8·0569	573	328329	188132517	23·9374	8·3059
524	274576	143877824	22·8910	8·0620	574	329476	189119224	23·9583	8·3107
525	275625	144703125	22·9129	8·0671	575	330625	190109375	23·9792	8·3155
526	276676	145531576	22·9347	8·0723	576	331776	191102976	24·0000	8·3203
527	277729	146363183	22·9565	8·0774	577	332929	192100033	24·0208	8·3251
528	278784	147197952	22·9783	8·0825	578	334084	193100552	24·0416	8·3300
529	279841	148035889	23·0000	8·0876	579	335241	194104539	24·0624	8·3348
530	280900	148877000	23·0217	8·0927	580	336400	195112000	24·0832	8·3396
531	281961	149721291	23·0434	8·0978	581	337561	196122941	24·1039	8·3443
532	283024	150568768	23·0651	8·1028	582	338724	197137368	24·1247	8·3491
533	284089	151419437	23·0868	8·1079	583	339889	198155287	24·1454	8·3539
534	285156	152273304	23·1084	8·1130	584	341056	199176704	24·1661	8·3587
535	286225	153130375	23·1301	8·1180	585	342225	200201625	24·1868	8·3634
536	287296	153990656	23·1517	8·1231	586	343396	201230056	24·2074	8·3682
537	288369	154854153	23·1733	8·1281	587	344569	202262003	24·2281	8·3730
538	289444	155720872	23·1948	8·1332	588	345744	203297472	24·2487	8·3777
539	290521	156590819	23·2164	8·1382	589	346921	204336469	24·2693	8·3825
540	291600	157464000	23·2379	8·1433	590	348100	205379000	24·2899	8·3872
541	292681	158340421	23·2594	8·1483	591	349281	206425071	24·3105	8·3919
542	293764	159220088	23·2809	8·1533	592	350464	207474688	24·3311	8·3967
543	294849	160103007	23·3024	8·1583	593	351649	208527857	24·3516	8·4014
544	295936	160989184	23·3238	8·1633	594	352836	209584584	24·3721	8·4061
545	297025	161878625	23·3452	8·1683	595	354025	210644875	24·3926	8·4108
546	298116	162771336	23·3666	8·1733	596	355216	211708736	24·4131	8·4155
547	299209	163667323	23·3880	8·1783	597	356409	212776173	24·4336	8·4202
548	300304	164566592	23·4094	8·1833	598	357604	213847192	24·4540	8·4249
549	301401	165469149	23·4307	8·1882	599	358801	214921799	24·4745	8·4296

DORMAN, LONG & CO. LIMITED.

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, NOS. FROM 1 TO 1,000.

No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$	No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$
600	360000	216000000	24·4949	8·4343	650	422500	274625000	25·4951	8·6624
601	361201	217081801	24·5153	8·4390	651	423801	275894451	25·5147	8·6668
602	362404	218167208	24·5357	8·4437	652	425104	277167808	25·5343	8·6713
603	363609	219256227	24·5561	8·4484	653	426409	278445077	25·5539	8·6757
604	364816	220348864	24·5764	8·4530	654	427716	279726264	25·5734	8·6801
605	366025	221445125	24·5967	8·4577	655	429025	281011375	25·5930	8·6845
606	367236	222545016	24·6171	8·4623	656	430336	282300416	25·6125	8·6890
607	368449	223648543	24·6374	8·4670	657	431649	283593393	25·6320	8·6934
608	369664	224755712	24·6577	8·4716	658	432964	284890312	25·6515	8·6978
609	370881	225866529	24·6779	8·4763	659	434281	286191179	25·6710	8·7022
610	372100	226981000	24·6982	8·4809	660	435600	287496000	25·6905	8·7066
611	373321	228099131	24·7184	8·4856	661	436921	288804781	25·7099	8·7110
612	374544	229220928	24·7386	8·4902	662	438244	290117528	25·7294	8·7154
613	375769	230346397	24·7588	8·4948	663	439569	291434247	25·7488	8·7198
614	376996	231475544	24·7790	8·4994	664	440896	292754944	25·7682	8·7241
615	378225	232608375	24·7992	8·5040	665	442225	294079625	25·7876	8·7285
616	379456	233744896	24·8193	8·5086	666	443556	295408296	25·8070	8·7329
617	380689	234885113	24·8395	8·5132	667	444889	296740963	25·8263	8·7373
618	381924	236029032	24·8596	8·5178	668	446224	298077632	25·8457	8·7416
619	383161	237176659	24·8797	8·5224	669	447561	299418309	25·8650	8·7460
620	384400	238328000	24·8998	8·5270	670	448900	300763000	25·8844	8·7503
621	385641	239483061	24·9199	8·5316	671	450241	302111711	25·9037	8·7547
622	386884	240641848	24·9399	8·5362	672	451584	303464448	25·9230	8·7590
623	388129	241804367	24·9600	8·5408	673	452929	304821217	25·9422	8·7634
624	389376	242970624	24·9800	8·5453	674	454276	306182024	25·9615	8·7677
625	390625	244140625	25·0000	8·5499	675	455625	307546875	25·9808	8·7721
626	391876	245314376	25·0200	8·5544	676	456976	308915776	26·0000	8·7764
627	393129	246491883	25·0400	8·5590	677	458329	310288733	26·0192	8·7807
628	394384	247673152	25·0599	8·5635	678	459684	311665752	26·0384	8·7850
629	395641	248858189	25·0799	8·5681	679	461041	313046839	26·0576	8·7893
630	396900	250047000	25·0998	8·5726	680	462400	314432000	26·0768	8·7937
631	398161	251239591	25·1197	8·5772	681	463761	315821241	26·0960	8·7980
632	399424	252435968	25·1396	8·5817	682	465124	317214568	26·1151	8·8023
633	400689	253636137	25·1595	8·5862	683	466489	318611987	26·1343	8·8066
634	401956	254840104	25·1794	8·5907	684	467856	320013504	26·1534	8·8109
635	403225	256047875	25·1992	8·5952	685	469225	321419125	26·1725	8·8152
636	404496	257259456	25·2190	8·5997	686	470596	322828856	26·1916	8·8194
637	405769	258474853	25·2389	8·6043	687	471969	324242703	26·2107	8·8237
638	407044	259694072	25·2587	8·6088	688	473344	325660672	26·2298	8·8280
639	408321	260917119	25·2784	8·6132	689	474721	327082769	26·2488	8·8323
640	409600	262144000	25·2982	8·6177	690	476100	328509000	26·2679	8·8366
641	410881	263374721	25·3180	8·6222	691	477481	329939371	26·2869	8·8408
642	412164	264609288	25·3377	8·6267	692	478864	331373888	26·3059	8·8451
643	413449	265847707	25·3574	8·6312	693	480249	332812557	26·3249	8·8493
644	414736	267089984	25·3772	8·6357	694	481636	334255384	26·3439	8·8536
645	416025	268336125	25·3969	8·6401	695	483025	335702375	26·3629	8·8578
646	417316	269586136	25·4165	8·6446	696	484416	337153536	26·3818	8·8621
647	418609	270840023	25·4362	8·6490	697	485809	338608873	26·4008	8·8663
648	419904	272097792	25·4558	8·6535	698	487204	340068392	26·4197	8·8706
649	421201	273359449	25·4755	8·6579	699	488601	341532099	26·4386	8·8748

DORMAN, LONG & CO. LIMITED.

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, NOS. FROM 1 TO 1,000.

No.	Square	Cube	Square Root √	Cube Root ∛	No.	Square	Cube	Square Root √	Cube Root ∛
700	490000	343000000	26·4575	8·8790	750	562500	421875000	27·3861	9·0856
701	491401	344472101	26·4764	8·8833	751	564001	423564751	27·4044	9·0896
702	492804	345948408	26·4953	8·8875	752	565504	425259008	27·4226	9·0937
703	494209	347428927	26·5141	8·8917	753	567009	426957777	27·4408	9·0977
704	495616	348913664	26·5330	8·8959	754	568516	428661064	27·4591	9·1017
705	497025	350402625	26·5518	8·9001	755	570025	430368875	27·4773	9·1057
706	498436	351895816	26·5707	8·9043	756	571536	432081216	27·4955	9·1098
707	499849	353393243	26·5895	8·9085	757	573049	433798093	27·5136	9·1138
708	501264	354894912	26·6083	8·9127	758	574564	435519512	27·5318	9·1178
709	502681	356400829	26·6271	8·9169	759	576081	437245479	27·5500	9·1218
710	504100	357911000	26·6458	8·9211	760	577600	438976000	27·5681	9·1258
711	505521	359425431	26·6646	8·9253	761	579121	440711081	27·5862	9·1298
712	506944	360944128	26·6833	8·9295	762	580644	442450728	27·6043	9·1338
713	508369	362467097	26·7021	8·9337	763	582169	444194947	27·6225	9·1378
714	509796	363994344	26·7208	8·9378	764	583696	445943744	27·6405	9·1418
715	511225	365525875	26·7395	8·9420	765	585225	447697125	27·6586	9·1458
716	512656	367061696	26·7582	8·9462	766	586756	449455096	27·6767	9·1498
717	514089	368601813	26·7769	8·9503	767	588289	451217663	27·6948	9·1537
718	515524	370146232	26·7955	8·9545	768	589824	452984832	27·7128	9·1577
719	516961	371694959	26·8142	8·9587	769	591361	454756609	27·7308	9·1617
720	518400	373248000	26·8328	8·9628	770	592900	456533000	27·7489	9·1657
721	519841	374805361	26·8514	8·9670	771	594441	458314011	27·7669	9·1696
722	521284	376367048	26·8701	8·9711	772	595984	460099648	27·7849	9·1736
723	522729	377933067	26·8887	8·9752	773	597529	461889917	27·8029	9·1775
724	524176	379503424	26·9072	8·9794	774	599076	463684824	27·8209	9·1815
725	525625	381078125	26·9258	8·9835	775	600625	465484375	27·8388	9·1855
726	527076	382657176	26·9444	8·9876	776	602176	467288576	27·8568	9·1894
727	528529	384240583	26·9629	8·9918	777	603729	469097433	27·8747	9·1933
728	529984	385828352	26·9815	8·9959	778	605284	470910952	27·8927	9·1973
729	531441	387420489	27·0000	9·0000	779	606841	472729139	27·9106	9·2012
730	532900	389017000	27·0185	9·0041	780	608400	474552000	27·9285	9·2052
731	534361	390617891	27·0370	9·0082	781	609961	476379541	27·9464	9·2091
732	535824	392223168	27·0555	9·0123	782	611524	478211768	27·9643	9·2130
733	537289	393832837	27·0740	9·0164	783	613089	480048687	27·9821	9·2170
734	538756	395446904	27·0924	9·0205	784	614656	481890304	28·0000	9·2209
735	540225	397065375	27·1109	9·0246	785	616225	483736625	28·0179	9·2248
736	541696	398688256	27·1293	9·0287	786	617796	485587656	28·0357	9·2287
737	543169	400315553	27·1477	9·0328	787	619369	487443403	28·0535	9·2326
738	544644	401947272	27·1662	9·0369	788	620944	489303872	28·0713	9·2365
739	546121	403583419	27·1845	9·0410	789	622521	491169069	28·0891	9·2404
740	547600	405224000	27·2029	9·0450	790	624100	493039000	28·1069	9·2443
741	549081	406869021	27·2213	9·0491	791	625681	494913671	28·1247	9·2482
742	550564	408518488	27·2397	9·0532	792	627264	496793088	28·1425	9·2521
743	552049	410172407	27·2580	9·0572	793	628849	498677257	28·1603	9·2560
744	553536	411830784	27·2764	9·0613	794	630436	500566184	28·1780	9·2599
745	555025	413493625	27·2947	9·0654	795	632025	502459875	28·1957	9·2638
746	556516	415160936	27·3130	9·0694	796	633616	504358336	28·2135	9·2677
747	558009	416832723	27·3313	9·0735	797	635209	506261573	28·2312	9·2716
748	559504	418508992	27·3496	9·0775	798	636804	508169592	28·2489	9·2754
749	561001	420189749	27·3679	9·0816	799	638401	510082399	28·2666	9·2793

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, NOS. FROM 1 TO 1,000.

No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$	No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$
800	640000	512000000	28·2843	9·2832	850	722500	614125000	29·1548	9·4727
801	641601	513922401	28·3019	9·2870	851	724201	616295051	29·1719	9·4764
802	643204	515849608	28·3196	9·2909	852	725904	618470208	29·1890	9·4801
803	644809	517781627	28·3373	9·2948	853	727609	620650477	29·2062	9·4838
804	646416	519718464	28·3549	9·2986	854	729316	622835864	29·2233	9·4875
805	648025	521660125	28·3725	9·3025	855	731025	625026375	29·2404	9·4912
806	649636	523606616	28·3901	9·3063	856	732736	627222016	29·2575	9·4949
807	651249	525557943	28·4077	9·3102	857	734449	629422793	29·2746	9·4986
808	652864	527514112	28·4253	9·3140	858	736164	631628712	29·2916	9·5023
809	654481	529475129	28·4429	9·3179	859	737881	633839779	29·3087	9·5060
810	656100	531441000	28·4605	9·3217	860	739600	636056000	29·3258	9·5097
811	657721	533411731	28·4781	9·3255	861	741321	638277381	29·3428	9·5134
812	659344	535387328	28·4956	9·3294	862	743044	640503928	29·3598	9·5171
813	660969	537367797	28·5132	9·3332	863	744769	642735647	29·3769	9·5207
814	662596	539353144	28·5307	9·3370	864	746496	644972544	29·3939	9·5244
815	664225	541343375	28·5482	9·3408	865	748225	647214625	29·4109	9·5281
816	665856	543338496	28·5657	9·3447	866	749956	649461896	29·4279	9·5317
817	667489	545338513	28·5832	9·3485	867	751689	651714363	29·4449	9·5354
818	669124	547343432	28·6007	9·3523	868	753424	653972032	29·4618	9·5391
819	670761	549353259	28·6182	9·3561	869	755161	656234909	29·4788	9·5427
820	672400	551368000	28·6356	9·3599	870	756900	658503000	29·4958	9·5464
821	674041	553387661	28·6531	9·3637	871	758641	660776311	29·5127	9·5501
822	675684	555412248	28·6705	9·3675	872	760384	663054848	29·5296	9·5537
823	677329	557441767	28·6880	9·3713	873	762129	665338617	29·5466	9·5574
824	678976	559476224	28·7054	9·3751	874	763876	667627624	29·5635	9·5610
825	680625	561515625	28·7228	9·3789	875	765625	669921875	29·5804	9·5647
826	682276	563559976	28·7402	9·3827	876	767376	672221376	29·5973	9·5683
827	683929	565609283	28·7576	9·3865	877	769129	674526133	29·6142	9·5719
828	685584	567663552	28·7750	9·3902	878	770884	676836152	29·6311	9·5756
829	687241	569722789	28·7924	9·3940	879	772641	679151439	29·6479	9·5792
830	688900	571787000	28·8097	9·3978	880	774400	681472000	29·6648	9·5828
831	690561	573856191	28·8271	9·4016	881	776161	683797841	29·6816	9·5865
832	692224	575930368	28·8444	9·4053	882	777924	686128968	29·6985	9·5901
833	693889	578009537	28·8617	9·4091	883	779689	688465387	29·7153	9·5937
834	695556	580093704	28·8791	9·4129	884	781456	690807104	29·7321	9·5973
835	697225	582182875	28·8964	9·4166	885	783225	693154125	29·7489	9·6010
836	698896	584277056	28·9137	9·4204	886	784996	695506456	29·7658	9·6046
837	700569	586376253	28·9310	9·4241	887	786769	697864103	29·7825	9·6082
838	702244	588480472	28·9482	9·4279	888	788544	700227072	29·7993	9·6118
839	703921	590589719	28·9655	9·4316	889	790321	702595369	29·8161	9·6154
840	705600	592704000	28·9828	9·4354	890	792100	704969000	29·8329	9·6190
841	707281	594823321	29·0000	9·4391	891	793881	707347971	29·8496	9·6226
842	708964	596947688	29·0172	9·4429	892	795664	709732288	29·8664	9·6262
843	710649	599077107	29·0345	9·4466	893	797449	712121957	29·8831	9·6298
844	712336	601211584	29·0517	9·4503	894	799236	714516984	29·8998	9·6334
845	714025	603351125	29·0689	9·4541	895	801025	716917375	29·9166	9·6370
846	715716	605495736	29·0861	9·4578	896	802816	719323136	29·9333	9·6406
847	717409	607645423	29·1033	9·4615	897	804609	721734273	29·9500	9·6442
848	719104	609800192	29·1204	9·4652	898	806404	724150792	29·9666	9·6477
849	720801	611960049	29·1376	9·4690	899	808201	726572699	29·9833	9·6513

DORMAN, LONG & CO. LIMITED.

SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, NOS. FROM 1 TO 1,000.

No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$	No.	Square	Cube	Square Root $\sqrt{}$	Cube Root $\sqrt[3]{}$
900	810000	729000000	30·0000	9·6549	950	902500	857375000	30·8221	9·8305
901	811801	731432701	30·0167	9·6585	951	904401	860085351	30·8383	9·8339
902	813604	733870808	30·0333	9·6620	952	906304	862801408	30·8545	9·8374
903	815409	736314327	30·0500	9·6656	953	908209	865523177	30·8707	9·8408
904	817216	738763264	30·0666	9·6692	954	910116	868250664	30·8869	9·8443
905	819025	741217625	30·0832	9·6727	955	912025	870983875	30·9031	9·8477
906	820836	743677316	30·0098	9·6763	956	913936	873722816	30·9192	9·8511
907	822649	746142643	30·1164	9·6799	957	915849	876467493	30·9354	9·8546
908	824464	748613312	30·1330	9·6834	958	917764	879217912	30·9516	9·8580
909	826281	751089429	30·1496	9·6870	959	919681	881974079	30·9677	9·8614
910	828100	753571000	30·1662	9·6905	960	921600	884736000	30·9839	9·8648
911	829921	756058031	30·1828	9·6941	961	923521	887503681	31·0000	9·8683
912	831744	758550528	30·1993	9·6976	962	925444	890277128	31·0161	9·8717
913	833569	761048497	30·2159	9·7012	963	927369	893056347	31·0322	9·8751
914	835396	763551944	30·2324	9·7047	964	929296	895841344	31·0483	9·8785
915	837225	766060875	30·2490	9·7082	965	931225	898632125	31·0644	9·8819
916	839056	768575296	30·2655	9·7118	966	933156	901428696	31·0805	9·8854
917	840889	771095213	30·2820	9·7153	967	935089	904231063	31·0966	9·8888
918	842724	773620632	30·2985	9·7188	968	937024	907039232	31·1127	9·8922
919	844561	776151559	30·3150	9·7224	969	938961	909853209	31·1288	9·8956
920	846400	778688000	30·3315	9·7259	970	940900	912673000	31·1448	9·8990
921	848241	781229961	30·3480	9·7294	971	942841	915498611	31·1609	9·9024
922	850084	783777448	30·3645	9·7329	972	944784	918330048	31·1769	9·9058
923	851929	876330467	30·3809	9·7364	973	946729	921167317	31·1929	9·9092
924	853776	788889204	30·3974	9·7400	974	948676	924010424	31·2090	9·9126
925	855625	791453125	30·4138	9·7435	975	950625	926859375	31·2250	9·9160
926	857476	794022776	30·4302	9·7470	976	952576	929714176	31·2410	9·9194
927	859329	796597983	30·4467	9·7505	977	954529	932574833	31·2570	9·9227
928	861184	799178752	30·4631	9·7540	978	956484	935441352	31·2730	9·9261
929	863041	801765089	30·4795	9·7575	979	958441	938313739	31·2890	9·9295
930	864900	804357000	30·4959	9·7610	980	960400	941192000	31·3050	9·9329
931	856761	805954491	30·5123	9·7645	981	962361	944076141	31·3209	9·9363
932	868624	809557568	30·5287	9·7680	982	964324	946966168	31·3369	9·9396
933	870489	812166237	30·5450	9·7715	983	966289	949862087	31·3528	9·9430
934	872356	814780504	30·5614	9·7750	984	968256	952763904	31·3688	9·9464
935	874225	817400375	30·5778	9·7785	985	970225	955671625	31·3847	9·9497
936	876096	820025856	30·5941	9·7819	986	972196	958585256	31·4006	9·9531
937	877969	822656953	30·6105	9·7854	987	974169	961504803	31·4166	9·9565
938	879844	825293672	30·6268	9·7889	988	976144	964430272	31·4325	9·9598
939	881721	827936019	30·6431	9·7924	989	978121	967361669	31·4484	9·9632
940	883600	830584000	30·6594	9·7959	990	980100	970299000	31·4643	9·9666
941	885481	833237621	30·6757	9·7993	991	982081	973242271	31·4802	9·9699
942	887364	835896888	30·6920	9·8028	992	984064	976191488	31·4960	9·9733
943	889249	838561807	30·7083	9·8063	993	986049	979146657	31·5119	9·9766
944	891136	841232384	30·7246	9·8097	994	988036	982107784	31·5278	9·9800
945	893025	843908625	30·7409	9·8132	995	990025	985074875	31·5436	9·9833
946	894916	846590536	30·7571	9·8167	996	992016	988047936	31·5595	9·9866
947	896809	849278123	30·7734	9·8201	997	994009	991026973	31·5753	9·9900
948	898704	851971392	30·7896	9·8236	998	996004	994011992	31·5911	9·9933
949	900601	854670349	30·8058	9·8270	999	998001	997002999	31·6070	9·9967

LOGARITHMS OF NUMBERS FROM 0 TO 1,000.

No.	0	1	2	3	4	5	6	7	8	9
0	0	00000	30103	47712	60206	69897	77815	84510	90309	95424
10	00000	00432	00860	01284	01703	02119	02531	02938	03342	03743
11	04139	04532	04922	05308	05690	06070	06446	06819	07188	07555
12	07918	08279	08636	08991	09342	09691	10037	10380	10721	11059
13	11394	11727	12057	12385	12710	13033	13354	13672	13988	14301
14	14613	14922	15229	15534	15836	16137	16435	16732	17026	17319
15	17609	17898	18184	18469	18752	19033	19312	19590	19866	20140
16	20412	20683	20951	21219	21484	21748	22011	22272	22531	22789
17	23045	23300	23553	23805	24055	24304	24551	24797	25042	25285
18	25527	25768	26007	26245	26482	26717	26951	27184	27416	27646
19	27875	28103	28330	28556	28780	29003	29226	29447	29667	29885
20	30103	30320	30535	30750	30963	31175	31387	31597	31806	32015
21	32222	32428	32634	32838	33041	33244	33445	33646	33846	34044
22	34242	34439	34635	34830	35025	35218	35411	35603	35793	35984
23	36173	36361	36549	36736	36922	37107	37291	37475	37658	37840
24	38021	38202	38382	38561	38739	38917	39094	39270	39445	39620
25	39794	39967	40140	40312	40483	40654	40824	40993	41162	41330
26	41497	41664	41830	41996	42160	42325	42488	42651	42813	42975
27	43136	43297	43457	43616	43775	43933	44091	44248	44404	44560
28	44716	44871	45025	45179	45332	45484	45637	45788	45939	46090
29	46240	46389	46538	46687	46835	46982	47129	47276	47422	47567
30	47712	47857	48001	48144	48287	48430	48572	48714	48855	48996
31	49136	49276	49415	49554	49693	49831	49969	50106	50243	50379
32	50515	50650	50786	50920	51054	51188	51322	51455	51587	51720
33	51851	51983	52114	52244	52375	52504	52634	52763	52892	53020
34	53148	53275	53403	53529	53656	53782	53908	54033	54158	54283
35	54407	54531	54654	54777	54900	55023	55145	55267	55388	55509
36	55630	55751	55871	55991	56110	56229	56348	56467	56585	56703
37	56820	56937	57054	57171	57287	57403	57519	57634	57749	57864
38	57978	58092	58206	58320	58433	58546	58659	58771	58883	58995
39	59106	59218	59329	59439	59550	59660	59770	59879	59988	60097
40	60206	60314	60423	60530	60638	60745	60853	60959	61066	61172
41	61278	61384	61490	61595	61700	61805	61909	62014	62118	62221
42	62325	62428	62531	62634	62737	62839	62941	63043	63144	63246
43	63347	63448	63548	63649	63749	63849	63949	64048	64147	64246
44	64345	64444	64542	64640	64738	64836	64933	65031	65128	65225
45	65321	65418	65514	65610	65706	65801	65896	65992	66087	66181
46	66276	66370	66464	66558	66652	66745	66839	66932	67025	67117
47	67210	67302	67394	67486	67578	67669	67761	67852	67943	68034
48	68124	68215	68305	68395	68485	68574	68664	68753	68842	68931
49	69020	69108	69197	69285	69373	69461	69548	69636	69723	69810
50	69897	69984	70070	70157	70243	70329	70415	70501	70586	70672
51	70757	70842	70927	71012	71096	71181	71265	71349	71433	71517
52	71600	71684	71767	71850	71933	72016	72099	72181	72263	72346
53	72428	72509	72591	72673	72754	72835	72916	72997	73078	73159
54	73239	73320	73400	73480	73560	73640	73719	73799	73878	73957

LOGARITHMS OF NUMBERS FROM 0 TO 1,000.

No.	0	1	2	3	4	5	6	7	8	9
55	74036	74115	74194	74273	74351	74429	74507	74586	74663	74741
56	74819	74896	74974	75051	75128	75205	75282	75358	75435	75511
57	75587	75664	75740	75815	75891	75967	76042	76118	76193	76268
58	76343	76418	76492	76567	76641	76716	76790	76864	76938	77012
59	77085	77159	77232	77305	77379	77452	77525	77597	77670	77743
60	77815	77887	77960	78032	78104	78176	78247	78319	78390	78462
61	78533	78604	78675	78746	78817	78888	78958	79029	79099	79169
62	79239	79309	79379	79449	79518	79588	79657	79727	79796	79865
63	79934	80003	80072	80140	80209	80277	80346	80414	80482	80550
64	80618	80686	80753	80821	80889	80956	81023	81090	81157	81224
65	81291	81358	81425	81491	81558	81624	81690	81757	81823	81889
66	81954	82020	82086	82151	82217	82282	82347	82413	82478	82543
67	82607	82672	82737	82802	82866	82930	82995	83059	83123	83187
68	83251	83315	83378	83442	83506	83569	83632	83696	83759	83822
69	83885	83948	84011	84073	84136	84198	84261	84323	84386	84448
70	84510	84572	84634	84696	84757	84819	84880	84942	85003	85065
71	85126	85187	85248	85309	85370	85431	85491	85552	85612	85673
72	85733	85794	85854	85914	85974	86034	86094	86153	86213	86273
73	86332	86392	86451	86510	86570	86629	86688	86747	86806	86864
74	86923	86982	87040	87099	87157	87216	87274	87332	87390	87448
75	87506	87564	87622	87679	87737	87795	87852	87910	87967	88024
76	88081	88138	88195	88252	88309	88366	88423	88480	88536	88593
77	88649	88705	88762	88818	88874	88930	88986	89042	89098	89154
78	89209	89265	89321	89376	89432	89487	89542	89597	89653	89708
79	89763	89818	89873	89927	89982	90037	90091	90146	90200	90255
80	90309	90363	90417	90472	90526	90580	90633	90687	90741	90795
81	90848	90902	90956	91009	91062	91116	91169	91222	91275	91328
82	91381	91434	91487	91540	91593	91645	91698	91751	91803	91855
83	91908	91960	92012	92064	92117	92169	92221	92273	92324	92376
84	92428	92480	92531	92583	92634	92686	92737	92788	92840	92891
85	92942	92993	93044	93095	93146	93197	93247	93298	93349	93399
86	93450	93500	93551	93601	93651	93702	93752	93802	93852	93902
87	93952	94002	94052	94101	94151	94201	94250	94300	94349	94399
88	94448	94498	94547	94596	94645	94694	94743	94792	94841	94890
89	94939	94988	95036	95085	95134	95182	95231	95279	95328	95376
90	95424	95472	95521	95569	95617	95665	95713	95761	95809	95856
91	95904	95952	95999	96047	96095	96142	96190	96237	96284	96332
92	96379	96426	96473	96520	96567	96614	96661	96708	96755	96802
93	96848	96895	96942	96988	97035	97081	97128	97174	97220	97267
94	97313	97359	97405	97451	97497	97543	97589	97635	97681	97727
95	97772	97818	97864	97909	97955	98000	98046	98091	98137	98182
96	98227	98272	98318	98363	98408	98453	98498	98543	98588	98632
97	98677	98722	98767	98811	98856	98900	98945	98989	99034	99078
98	99123	99167	99211	99255	99300	99344	99388	99432	99476	99520
99	99564	99607	99651	99695	99739	99782	99826	99870	99913	99957

DORMAN, LONG & CO. LIMITED.

Degrees	SINE							
	0′	10′	20′	30′	40′	50′	60′	
0	..	·00291	·00582	·00873	·01164	·01454	·01745	89
1	·01745	·02036	·02327	·02618	·02908	·03199	·03490	88
2	·03490	·03781	·04071	·04362	·04653	·04943	·05234	87
3	·05234	·05524	·05814	·06105	·06395	·06685	·06976	86
4	·06976	·07266	·07556	·07846	·08136	·08426	·08716	85
5	·08716	·09005	·09295	·09585	·09874	·10164	·10453	84
6	·10453	·10742	·11031	·11320	·11609	·11898	·12187	83
7	·12187	·12476	·12764	·13053	·13341	·13629	·13917	82
8	·13917	·14205	·14493	·14781	·15069	·15356	·15643	81
9	·15643	·15931	·16218	·16505	·16792	·17078	·17365	80
10	·17365	·17651	·17937	·18224	·18509	·18795	·19081	79
11	·19081	·19366	·19652	·19937	·20222	·20507	·20791	78
12	·20791	·21076	·21360	·21644	·21928	·22212	·22495	77
13	·22495	·22778	·23062	·23345	·23627	·23910	·24192	76
14	·24192	·24474	·24756	·25038	·25320	·25601	·25882	75
15	·25882	·26163	·26443	·26724	·27004	·27284	·27564	74
16	·27564	·27843	·28123	·28402	·28680	·28959	·29237	73
17	·29237	·29515	·29793	·30071	·30348	·30625	·30902	72
18	·30902	·31178	·31454	·31730	·32006	·32282	·32557	71
19	·32557	·32832	·33106	·33381	·33655	·33929	·34202	70
20	·34202	·34475	·34748	·35021	·35293	·35565	·35837	69
21	·35837	·36108	·36379	·36650	·36921	·37191	·37461	68
22	·37461	·37730	·37999	·38268	·38537	·38805	·39073	67
23	·39073	·39341	·39608	·39875	·40142	·40408	·40674	66
24	·40674	·40939	·41204	·41469	·41734	·41998	·42262	65
25	·42262	·42525	·42788	·43051	·43313	·43575	·43837	64
26	·43837	·44098	·44359	·44620	·44880	·45140	·45399	63
27	·45399	·45658	·45917	·46175	·46433	·46690	·46947	62
28	·46947	·47204	·47460	·47716	·47971	·48226	·48481	61
29	·48481	·48735	·48989	·49242	·49495	·49748	·50000	60
30	·50000	·50252	·50503	·50754	·51004	·51254	·51504	59
31	·51504	·51753	·52002	·52250	·52498	·52745	·52992	58
32	·52992	·53238	·53484	·53730	·53975	·54220	·54464	57
33	·54464	·54708	·54951	·55194	·55436	·55678	·55919	56
34	·55919	·56160	·56401	·56641	·56880	·57119	·57358	55
35	·57358	·57596	·57833	·58070	·58307	·58543	·58779	54
36	·58779	·59014	·59248	·59482	·59716	·59949	·60182	53
37	·60182	·60414	·60645	·60876	·61107	·61337	·61566	52
38	·61566	·61795	·62024	·62251	·62479	·62706	·62932	51
39	·62932	·63158	·63383	·63608	·63832	·64056	·64279	50
40	·64279	·64501	·64723	·64945	·65166	·65386	·65606	49
41	·65606	·65825	·66044	·66262	·66480	·66697	·66913	48
42	·66913	·67129	·67344	·67559	·67773	·67987	·68200	47
43	·68200	·68412	·68624	·68835	·69046	·69256	·69466	46
44	·69466	·69675	·69883	·70091	·70298	·70505	·70711	45
	60′	50′	40′	30′	20′	10′	0′	Degrees
	COSINE							

Degrees	COSINE							
	0′	10′	20′	30′	40′	50′	60′	
0	1·	1·	·99998	·99996	·99993	·99989	·99985	89
1	·99985	·99979	·99973	·99966	·99958	·99949	·99939	88
2	·99939	·99929	·99917	·99905	·99892	·99878	·99863	87
3	·99863	·99847	·99831	·99813	·99795	·99776	·99756	86
4	·99756	·99736	·99714	·99692	·99668	·99644	·99619	85
5	·99619	·99594	·99567	·99540	·99511	·99482	·99452	84
6	·99452	·99421	·99390	·99357	·99324	·99290	·99255	83
7	·99255	·99219	·99182	·99144	·99106	·99067	·99027	82
8	·99027	·98986	·98944	·98902	·98858	·98814	·98769	81
9	·98769	·98723	·98676	·98629	·98580	·98531	·98481	80
10	·98481	·98430	·98378	·98325	·98272	·98218	·98163	79
11	·98163	·98107	·98050	·97992	·97934	·97875	·97815	78
12	·97815	·97754	·97692	·97630	·97566	·97502	·97437	77
13	·97437	·97371	·97304	·97237	·97169	·97100	·97030	76
14	·97030	·96959	·96887	·96815	·96742	·96667	·96593	75
15	·96593	·96517	·96440	·96363	·96285	·96206	·96126	74
16	·96126	·96046	·95964	·95882	·95799	·95715	·95630	73
17	·95630	·95545	·95459	·95372	·95284	·95195	·95106	72
18	·95106	·95015	·94924	·94832	·94740	·94646	·94552	71
19	·94552	·94457	·94361	·94264	·94167	·94068	·93969	70
20	·93969	·93869	·93769	·93667	·93565	·93462	·93358	69
21	·93358	·93253	·93148	·93042	·92935	·92827	·92718	68
22	·92718	·92609	·92499	·92388	·92276	·92164	·92050	67
23	·92050	·91936	·91822	·91706	·91590	·91472	·91355	66
24	·91355	·91236	·91116	·90996	·90875	·90753	·90631	65
25	·90631	·90507	·90383	·90259	·90133	·90007	·89879	64
26	·89879	·89752	·89623	·89493	·89363	·89232	·89101	63
27	·89101	·88968	·88835	·88701	·88566	·88431	·88295	62
28	·88295	·88158	·88020	·87882	·87743	·87603	·87462	61
29	·87462	·87321	·87178	·87036	·86892	·86748	·86603	60
30	·86603	·86457	·86310	·86163	·86015	·85866	·85717	59
31	·85717	·85567	·85416	·85264	·85112	·84959	·84805	58
32	·84805	·84650	·84495	·84339	·84182	·84025	·83867	57
33	·83867	·83708	·83549	·83389	·83228	·83066	·82904	56
34	·82904	·82741	·82577	·82413	·82248	·82082	·81915	55
35	·81915	·81748	·81580	·81412	·81242	·81072	·80902	54
36	·80902	·80730	·80558	·80386	·80212	·80038	·79864	53
37	·79864	·79688	·79512	·79335	·79158	·78980	·78801	52
38	·78801	·78622	·78442	·78261	·78079	·77897	·77715	51
39	·77715	·77531	·77347	·77162	·76977	·76791	·76604	50
40	·76604	·76417	·76229	·76041	·75851	·75661	·75471	49
41	·75471	·75280	·75088	·74896	·74703	·74509	·74314	48
42	·74314	·74120	·73924	·73728	·73531	·73333	·73135	47
43	·73135	·72937	·72737	·72537	·72337	·72136	·71934	46
44	·71934	·71732	·71529	·71325	·71121	·70916	·70711	45
	60′	50′	40′	30′	20′	10′	0′	Degrees
	SINE							

DORMAN, LONG & CO. LIMITED.

Degrees	TANGENT							
	0′	10′	20′	30′	40′	50′	60′	
0	..	·00291	·00582	·00873	·01164	·01455	·01746	89
1	·01746	·02036	·02328	·02619	·02910	·03201	·03492	88
2	·03492	·03783	·04075	·04366	·04658	·04949	·05241	87
3	·05241	·05533	·05824	·06116	·06408	·06700	·06993	86
4	·06993	·07285	·07578	·07870	·08163	·08456	·08749	85
5	·08749	·09042	·09335	·09629	·09923	·10216	·10510	84
6	·10510	·10805	·11099	·11394	·11688	·11983	·12278	83
7	·12278	·12574	·12869	·13165	·13461	·13758	·14054	82
8	·14054	·14351	·14648	·14945	·15243	·15540	·15838	81
9	·15838	·16137	·16435	·16734	·17033	·17333	·17633	80
10	·17633	·17933	·18233	·18534	·18835	·19136	·19438	79
11	·19438	·19740	·20042	·20345	·20648	·20952	·21256	78
12	·21256	·21560	·21864	·22169	·22475	·22781	·23087	77
13	·23087	·23393	·23700	·24008	·24316	·24624	·24933	76
14	·24933	·25242	·25552	·25862	·26172	·26483	·26795	75
15	·26795	·27107	·27419	·27732	·28046	·28360	·28675	74
16	·28675	·28990	·29305	·29621	·29938	·30255	·30573	73
17	·30573	·30891	·31210	·31530	·31850	·32171	·32492	72
18	·32492	·32814	·33136	·33460	·33783	·34108	·34433	71
19	·34433	·34758	·35085	·35412	·35740	·36068	·36397	70
20	·36397	·36727	·37057	·37388	·37720	·38053	·38386	69
21	·38386	·38721	·39055	·39391	·39727	·40065	·40403	68
22	·40403	·40741	·41081	·41421	·41763	·42105	·42447	67
23	·42447	·42791	·43136	·43481	·43828	·44175	·44523	66
24	·44523	·44872	·45222	·45573	·45924	·46277	·46631	65
25	·46631	·46985	·47341	·47698	·48055	·48414	·48773	64
26	·48773	·49134	·49495	·49858	·50222	·50587	·50953	63
27	·50953	·51320	·51688	·52057	·52427	·52798	·53171	62
28	·53171	·53545	·53920	·54296	·54673	·55051	·55431	61
29	·55431	·55812	·56194	·56577	·56962	·57348	·57735	60
30	·57735	·58124	·58513	·58905	·59297	·59691	·60086	59
31	·60086	·60483	·60881	·61280	·61681	·62083	·62487	58
32	·62487	·62892	·63299	·63707	·64117	·64528	·64941	57
33	·64941	·65355	·65771	·66189	·66608	·67028	·67451	56
34	·67451	.67875	·68301	·68728	·69157	·69588	·70021	55
35	·70021	·70455	·70891	·71329	·71769	·72211	·72654	54
36	·72654	·73100	·73547	·73996	·74447	·74900	·75355	53
37	·75355	·75812	·76272	·76733	·77196	·77661	·78129	52
38	·78129	·78598	·79070	·79544	·80020	·80498	·80978	51
39	·80978	·81461	·81946	·82434	·82923	·83415	·83910	50
40	·83910	·84407	·84906	·85408	·85912	·86419	·86929	49
41	·86929	·87441	·87955	·88473	·88992	·89515	·90040	48
42	·90040	·90569	·91099	·91633	·92170	·92709	·93252	47
43	·93252	·93797	·94345	·94896	·95451	·96008	·96569	46
44	·96569	·97133	·97700	·98270	·98843	·99420	1·	45
	60′	50′	40′	30′	20′	10′	0′	Degrees
	COTANGENT							

DORMAN, LONG & CO. LIMITED.

Degrees	COTANGENT							
	0′	10′	20′	30′	40′	50′	60′	
0	..	343·77371	171·88540	114·58865	85·93979	68·75009	57·28996	89
1	57·28996	49·10388	42·96408	38·18846	34·36777	31·24158	28·63625	88
2	28·63625	26·43160	24·54176	22·90377	21·47040	20·20555	19·08114	87
3	19·08114	18·07498	17·16934	16·34986	15·60478	14·92442	14·30067	86
4	14·30067	13·72674	13·19688	12·70621	12·25051	11·82617	11·43005	85
5	11·43005	11·05943	10·71191	10·38540	10·07803	9·78817	9·51436	84
6	9·51436	9·25530	9·00983	8·77689	8·55555	8·34496	8·14435	83
7	8·14435	7·95302	7·77035	7·59575	7·42871	7·26873	7·11537	82
8	7·11537	6·96823	6·82694	6·69116	6·56055	6·43484	6·31375	81
9	6·31375	6·19703	6·08444	5·97576	5·87080	5·76937	5·67128	80
10	5·67128	5·57638	5·48451	5·39552	5·30928	5·22566	5·14455	79
11	5·14455	5·06584	4·98940	4·91516	4·84300	4·77286	4·70463	78
12	4·70463	4·63825	4·57363	4·51071	4·44942	4·38969	4·33148	77
13	4·33148	4·27471	4·21933	4·16530	4·11256	4·06107	4·01078	76
14	4·01078	3·96165	3·91364	3·86671	3·82083	3·77595	3·73205	75
15	3·73205	3·68909	3·64705	3·60588	3·56557	3·52609	3·48741	74
16	3·48741	3·44951	3·41236	3·37594	3·34023	3·30521	3·27085	73
17	3·27085	3·23714	3·20406	3·17159	3·13972	3·10842	3·07768	72
18	3·07768	3·04749	3·01783	2·98869	2·96004	2·93189	2·90421	71
19	2·90421	2·87700	2·85023	2·82391	2·79802	2·77254	2·74748	70
20	2·74748	2·72281	2·69853	2·67462	2·65109	2·62791	2·60509	69
21	2·60509	2·58261	2·56046	2·53865	2·51715	2·49597	2·47509	68
22	2·47509	2·45451	2·43422	2·41421	2·39449	2·37504	2·35585	67
23	2·35585	2·33693	2·31826	2·29984	2·28167	2·26374	2·24604	66
24	2·24604	2·22857	2·21132	2·19430	2·17749	2·16090	2·14451	65
25	2·14451	2·12832	2·11233	2·09654	2·08094	2·06553	2·05030	64
26	2·05030	2·03526	2·02039	2·00569	1·99116	1·97680	1·96261	63
27	1·96261	1·94858	1·93470	1·92098	1·90741	1·89400	1·88073	62
28	1·88073	1·86760	1·85462	1·84177	1·82906	1·81649	1·80405	61
29	1·80405	1·79174	1·77955	1·76749	1·75556	1·74375	1·73205	60
30	1·73205	1·72047	1·70901	1·69766	1·68643	1·67530	1·66428	59
31	1·66428	1·65337	1·64256	1·63185	1·62125	1·61074	1·60033	58
32	1·60033	1·59002	1·57981	1·56969	1·55966	1·54972	1·53987	57
33	1·53987	1·53010	1·52043	1·51084	1·50133	1·49190	1·48256	56
34	1·48256	1·47330	1·46411	1·45501	1·44598	1·43703	1·42815	55
35	1·42815	1·41934	1·41061	1·40195	1·39336	1·38484	1·37638	54
36	1·37638	1·36800	1·35968	1·35142	1·34323	1·33511	1·32704	53
37	1·32704	1·31904	1·31110	3·30323	1·29541	1·28764	1·27994	52
38	1·27994	1·27230	1·26471	1·25717	1·24969	1·24227	1·23490	51
39	1·23490	1·22758	1·22031	1·21310	1·20593	1·19882	1·19175	50
40	1·19175	1·18474	1·17777	1·17085	1·16398	1·15715	1·15037	49
41	1·15037	1·14363	1·13694	1·13029	1·12369	1·11713	1·11061	48
42	1·11061	1·10414	1·09770	1·09131	1·08496	1·07864	1·07237	47
43	1·07237	1·06613	1·05994	1·05378	1·04766	1·04158	1·03553	46
44	1·03553	1·02952	1·02355	1·01761	1·01170	1·00583	1·	45
	60′	50′	40′	30′	20′	10′	0′	Degrees
	TANGENT							

DORMAN, LONG & CO. LIMITED.

LBS. RISING BY 7, EXPRESSED IN CWTS., QRS. & LBS. AND IN DECIMALS OF A TON.

Lbs.	c.	q.	lbs.	Ton	Lbs.	c.	q.	lbs.	Ton	Lbs.	c.	q.	lbs.	Ton
					336	3	0	0	·15	672	6	0	0	·3
7	..	..	7	·003125	343	3	0	7	·153125	679	6	0	7	·303125
14	..	..	14	·00625	350	3	0	14	·15625	686	6	0	14	·30625
21	..	..	21	·009375	357	3	0	21	·159375	693	6	0	21	·309375
28	..	1	0	·0125	364	3	1	0	·1625	700	6	1	0	·3125
35	..	1	7	·015625	371	3	1	7	·165625	707	6	1	7	·315625
42	..	1	14	·01875	378	3	1	14	·16875	714	6	1	14	·31875
49	..	1	21	·021875	385	3	1	21	·171875	721	6	1	21	·321875
56	..	2	0	·025	392	3	2	0	·175	728	6	2	0	·325
63	..	2	7	·028125	399	3	2	7	·178125	735	6	2	7	·328125
70	..	2	14	·03125	406	3	2	14	.18125	742	6	2	14	·33125
77	..	2	21	·034375	413	3	2	21	·184375	749	6	2	21	·334375
84	..	3	0	·375	420	3	3	0	·1875	756	6	3	0	·3375
91	..	3	7	·040625	427	3	3	7	·190625	763	6	3	7	·340625
98	..	3	14	·04375	434	3	3	14	·19375	770	6	3	14	·34375
105	..	3	21	·046875	441	3	3	21	·196875	777	6	3	21	·346875
112	1	0	0	·05	448	4	0	0	·2	784	7	0	0	·35
119	1	0	7	·053125	455	4	0	7	·203125	791	7	0	7	·353125
126	1	0	14	·05625	462	4	0	14	·20625	798	7	0	14	·35625
133	1	0	21	·059375	469	4	0	21	·209375	805	7	0	21	·359375
140	1	1	0	·0625	476	4	1	0	·2125	812	7	1	0	·3625
147	1	1	7	·065625	483	4	1	7	·215625	819	7	1	7	·365625
154	1	1	14	·06875	490	4	1	14	·21875	826	7	1	14	·36875
161	1	1	21	·071875	497	4	1	21	·221875	833	7	1	21	·371875
168	1	2	0	·075	504	4	2	0	·225	840	7	2	0	·375
175	1	2	7	·078125	511	4	2	7	·228125	847	7	2	7	·378125
182	1	2	14	·08125	518	4	2	14	·23125	854	7	2	14	·38125
189	1	2	21	·084375	525	4	2	21	·234375	861	7	2	21	·384375
196	1	3	0	·0875	532	4	3	0	·2375	868	7	3	0	·3875
203	1	3	7	·090625	539	4	3	7	·240625	875	7	3	7	·390625
210	1	3	14	·09375	546	4	3	14	·24375	882	7	3	14	·39375
217	1	3	21	·096875	553	4	3	21	·246875	889	7	3	21	·396875
224	2	0	0	·1	560	5	0	0	·25	896	8	0	0	·4
231	2	0	7	·103125	567	5	0	7	·253125	903	8	0	7	·403125
238	2	0	14	·10625	574	5	0	14	·25625	910	8	0	14	·40625
245	2	0	21	·109375	581	5	0	21	·259375	917	8	0	21	·409375
252	2	1	0	·1125	588	5	1	0	·2625	924	8	1	0	·4125
259	2	1	7	·115625	595	5	1	7	·265625	931	8	1	7	·415625
266	2	1	14	·11875	602	5	1	14	·26875	938	8	1	14	·41875
273	2	1	21	·121875	609	5	1	21	·271875	945	8	1	21	·421875
280	2	2	0	·125	616	5	2	0	·275	952	8	2	0	·425
287	2	2	7	·128125	623	5	2	7	·278125	959	8	2	7	·428125
294	2	2	14	·13125	630	5	2	14	·28125	966	8	2	14	·43125
301	2	2	21	·134375	637	5	2	21	·284375	973	8	2	21	·434375
308	2	3	0	·1375	644	5	3	0	·2875	980	8	3	0	·4375
315	2	3	7	·140625	651	5	3	7	·290625	987	8	3	7	·440625
322	2	3	14	·14375	658	5	3	14	·29375	994	8	3	14	·44375
329	2	3	21	·146875	665	5	3	21	·296875	1001	8	3	21	·446875

LBS. RISING BY 7, EXPRESSED IN CWTS., QRS. & LBS. AND IN DECIMALS OF A TON.

Lbs.	c.	q.	lbs.	Ton	Lbs.	c.	q.	lbs.	Ton	Lbs.	c.	q.	lbs.	Ton
1008	9	0	0	·45	1344	12	0	0	·6	1680	15	0	0	·75
1015	9	0	7	·453125	1351	12	0	7	·603125	1687	15	0	7	·753125
1022	9	0	14	·45625	1358	12	0	14	·60625	1694	15	0	14	·75625
1029	9	0	21	·459375	1365	12	0	21	·609375	1701	15	0	21	·759375
1036	9	1	0	·4625	1372	12	1	0	·6125	1708	15	1	0	·7625
1043	9	1	7	·465625	1379	12	1	7	·615625	1715	15	1	7	·765625
1050	9	1	14	·46875	1386	12	1	14	·61875	1722	15	1	14	·76875
1057	9	1	21	·471875	1393	12	1	21	·621875	1729	15	1	21	·771875
1064	9	2	0	·475	1400	12	2	0	·625	1736	15	2	0	·775
1071	9	2	7	·478125	1407	12	2	7	·628125	1743	15	2	7	·778125
1078	9	2	14	·48125	1414	12	2	14	·63125	1750	15	2	14	·78125
1085	9	2	21	·484375	1421	12	2	21	·634375	1757	15	2	21	·784375
1092	9	3	0	·4875	1428	12	3	0	·6375	1764	15	3	0	·7875
1099	9	3	7	·490625	1435	12	3	7	·640625	1771	15	3	7	·790625
1106	9	3	14	·49375	1442	12	3	14	·64375	1778	15	3	14	·79375
1113	9	3	21	·496875	1449	12	3	21	·646875	1785	15	3	21	·796875
1120	10	0	0	·5	1456	13	0	0	·65	1792	16	0	0	·8
1127	10	0	7	·503125	1463	13	0	7	·653125	1799	16	0	7	·803125
1134	10	0	14	·50625	1470	13	0	14	·65625	1806	16	0	14	·80625
1141	10	0	21	·509375	1477	13	0	21	·659375	1813	16	0	21	·809375
1148	10	1	0	·5125	1484	13	1	0	·6625	1820	16	1	0	·8125
1155	10	1	7	·515625	1491	13	1	7	·665625	1827	16	1	7	·815625
1162	10	1	14	·51875	1498	13	1	14	·66875	1834	16	1	14	·81875
1169	10	1	21	·521875	1505	13	1	21	·671875	1841	16	1	21	·821875
1176	10	2	0	·525	1512	13	2	0	·675	1848	16	2	0	·825
1183	10	2	7	·528125	1519	13	2	7	·678125	1855	16	2	7	·828125
1190	10	2	14	·53125	1526	13	2	14	·68125	1862	16	2	14	·83125
1197	10	2	21	·534375	1533	13	2	21	·684375	1869	16	2	21	·834375
1204	10	3	0	·5375	1540	13	3	0	·6875	1876	16	3	0	·8375
1211	10	3	7	·540625	1547	13	3	7	·690625	1883	16	3	7	·840625
1218	10	3	14	·54375	1554	13	3	14	·69375	1890	16	3	14	·84375
1225	10	3	21	·546875	1561	13	3	21	·696875	1897	16	3	21	·846875
1232	11	0	0	·55	1568	14	0	0	·7	1904	17	0	0	·85
1239	11	0	7	·553125	1575	14	0	7	·703125	1911	17	0	7	·853125
1246	11	0	14	·55625	1582	14	0	14	·70625	1918	17	0	14	·85625
1253	11	0	21	·559375	1589	14	0	21	·709375	1925	17	0	21	·859375
1260	11	1	0	·5625	1596	14	1	0	·7125	1932	17	1	0	·8625
1267	11	1	7	·565625	1603	14	1	7	·715625	1939	17	1	7	·865625
1274	11	1	14	·56875	1610	14	1	14	·71875	1946	17	1	14	·86875
1281	11	1	21	·571875	1617	14	1	21	·721875	1953	17	1	21	·871875
1288	11	2	0	·575	1624	14	2	0	·725	1960	17	2	0	·875
1295	11	2	7	·578125	1631	14	2	7	·728125	1967	17	2	7	·878125
1302	11	2	14	·58125	1638	14	2	14	·73125	1974	17	2	14	·88125
1309	11	2	21	·584375	1645	14	2	21	·734375	1981	17	2	21	·884375
1316	11	3	0	·5875	1652	14	3	0	·7375	1988	17	3	0	·8875
1323	11	3	7	·590625	1659	14	3	7	·740625	1995	17	3	7	·890625
1330	11	3	14	·59375	1666	14	3	14	·74375	2002	17	3	14	·89375
1337	11	3	21	·596875	1673	14	3	21	·746875	2009	17	3	21	·896875

LBS. RISING BY 7, EXPRESSED IN CWTS., QRS. & LBS. AND IN DECIMALS OF A TON—CONTINUED.

Lbs.	c.	q.	lbs.	Ton	Lbs.	c.	q.	lbs.	Ton
2016	18	0	0	·9	2128	19	0	0	·95
2023	18	0	7	·903125	2135	19	0	7	·953125
2030	18	0	14	·90625	2142	19	0	14	·95625
2037	18	0	21	·909375	2149	19	0	21	·959375
2044	18	1	0	·9125	2156	19	1	0	·9625
2051	18	1	7	·915625	2163	19	1	7	·965625
2058	18	1	14	·91875	2170	19	1	14	·96875
2065	18	1	21	·921875	2177	19	1	21	·971875
2072	18	2	0	·925	2184	19	2	0	·975
2079	18	2	7	·928125	2191	19	2	7	·978125
2086	18	2	14	·93125	2198	19	2	14	·98125
2093	18	2	21	·934375	2205	19	2	21	·984375
2100	18	3	0	·9375	2212	19	3	0	·9875
2107	18	3	7	·940625	2219	19	3	7	·990625
2114	18	3	14	·94375	2226	19	3	14	·99375
2121	18	3	21	·946875	2233	19	3	21	·996875
					2240	20	0	0	1·

CONVERSION TABLE—TONS INTO POUNDS.

Tons	Pounds	Tons	Pounds	Tons	Pounds	Tons	Pounds
1	2.240	26	58,240	51	114,240	76	170,240
2	4,480	27	60,480	52	116,480	77	172,480
3	6,720	28	62,720	53	118,720	78	174,720
4	8,960	29	64,960	54	120,960	79	176,960
5	11,200	30	67,200	55	123,200	80	179,200
6	13,440	31	69,440	56	125,440	81	181,440
7	15,680	32	71,680	57	127,680	82	183,680
8	17,920	33	73,920	58	129,920	83	185,920
9	20,160	34	76,160	59	132,160	84	188,160
10	22,400	35	78,400	60	134,400	85	190,400
11	24,640	36	80,640	61	136,640	86	192,640
12	26,880	37	82,880	62	138,880	87	194,880
13	29,120	38	85,120	63	141,120	88	197,120
14	31,360	39	87,360	64	143,360	89	199,360
15	33,600	40	89,600	65	145,600	90	201,600
16	35,840	41	91,840	66	147,840	91	203,840
17	38,080	42	94,080	67	150,080	92	206,080
18	40,320	43	96,320	68	152,320	93	208,320
19	42,560	44	98,560	69	154,560	94	210,560
20	44,800	45	100,800	70	156,800	95	212,800
21	47,040	46	103,040	71	159,040	96	215,040
22	49,280	47	105,280	72	161,280	97	217,280
23	51,520	48	107,520	73	163,520	98	219,520
24	53,760	49	109,760	74	165,760	99	221,760
25	56,000	50	112,000	75	168,000	100	224,000

APPROXIMATE LIVE LOAD ON FLOORS.

Crowd of People - - -	84 to 112 lbs. per sq. ft.
Floors of Dwellings and Offices -	56 to 112 ,, ,, ,,
Floors of Public Halls, Churches, Theatres, &c. - - -	100 to 160 ,, ,, ,,
Floors of Stores, Warehouses, &c. -	100 to 300 ,, ,, ,,
Floors of Workshops carrying heavy machinery - - -	200 to 400 ,, ,, ,,

APPROXIMATE WEIGHT, IN LBS. PER CUBIC FOOT, OF VARIOUS SUBSTANCES.

Barley	38
Wheat	48
Coal, ordinary, broken, loose	56
Coke	46
Concrete	112 to 130
Cast Iron	450
Lead	712
Masonry, granite	160
,, sandstone	140
Brickwork	112
Steel, rolled	489·6
Glass	160 to 190
Water, fresh	62·28

WEIGHT AND BULK OF WATER.

Fresh Water :— (at 62° Fahr.)	1 cubic foot	=	6·228 gallons.
	1 gallon	=	10lbs.
	1 gallon	=	·161 cubic foot.
	1 ton	=	36 cubic feet.
	1 ton	=	224 gallons.

The weight of fresh water is to that of sea water as 1 is to 1·026.

WEIGHTS AND MEASURES.

LINEAR MEASURE.

Inches	Feet	Yards	Poles	Furlongs	Mile
1	·08333	·02778	·0050505	·00012626	·00001578
12	1·	·33333	·0606061	·00151515	·00018939
36	3·	1·	·1818182	·00454545	·00056818
198	16·5	5·5	1·	·025	·003125
7920	660·	220·	40·	1·	·125
63360	5280·	1760·	320·	8·	1·

SURVEYING MEASURE (LINEAL).

Inches	Links	Feet	Yards	Chains	Mile
1·	·126	·0833	·0278	·00126	0000158
7·92	1·	·66	·22	·01	·000125
12	1·515	1·	·333	·01515	·000189
36·	4·545	3·	1·	·04545	·000568
792·	100·	66·	22·	1·	·0125
63360·	8000·	5280·	1760·	80·	1·

CUBIC MEASURE.

Inches	Feet	Yards
1·	·0005787	·00002143
1728·	1·	·03704
46656	27·	1·

WEIGHTS AND MEASURES.

SQUARE MEASURE.

Square Inches	Square Feet	Square Yards	Square Poles	Roods	Acres	Square Mile
1	·00694	·000772	....	....	....	....
144	1·	·11111	·003673	....	....	....
1296	9·	1·	·033058	·000826	....	....
..	272·25	30·25	1·	·025	·00625	....
..	10890·	1210·	40·	1·	·25	·0003906
..	43560·	4840·	160·	4·	1·	·0015615
..	....	3097600·	102400·	2560·	640·	1·

MEASURE OF CAPACITY.

Pints	Quarts	Gallons	Pecks	Bushels	Quarters	Cubic Inches
1	·5	·125	·0625	·015625	·001953125	34·683
2	1·	·25	·125	·03125	·00390625	69·366
8	4·	1·	·5	·125	·015625	277·463
16	8·	2·	1·	·25	·03125	554·926
64	32·	8·	4·	1·	·125	2219·704
512	256·	64·	32·	8·	1·	17757·632

AVOIRDUPOIS WEIGHT.

Grains	Drams	Ounces	Pounds	Hundred-weights	Gross Ton
1·	·03657	·002286	·000143	·00000128	·0000000637
27·34375	1·	·0625	·003906	·00003488	·000001744
437·5	16·	1·	·0625	·00055804	·00002790
7000·	256·	16·	1·	·0089286	·0004464
784000·	28672·	1792·	112·	1·	·05
15680000·	573440·	35840·	2240·	20·	1·

METRIC MEASURES.

LINEAR MEASURE.

Millimetres	Centimetres	Decimetres	Metres	Dekametres	Hectometres	Kilometre
1	·1	·01	·001	·0001	·00001	·000001
10	1·	·1	·01	·001	·0001	·00001
100	10·	1·	·1	·01	·001	·0001
1000	100·	10·	1·	·1	·01	·001
10000	1000·	100·	10·	1·	·1	·01
100000	10000·	1000·	100·	10·	1·	·1
1000000	100000·	10000·	1000·	100·	10·	1·

SQUARE MEASURE.

Square Centimetres	Square Decimetres	Square Metres	Ares or Square Decimetres	Hectare or Square Hectometre
1	·01	·00001	·00001	·00000001
100	1·	·01	·0001	·000001
10000	100·	1·	·01	·0001
1000000	10000·	100·	1·	·01
100000000	1000000·	10000·	100·	1·

CUBIC MEASURE.

Cubic Centimetres	Cubic Decimetres	Cubic Metre
1	001	·000001
1000	1·	·001
1000000	1000·	1·

METRIC MEASURES.

MEASURES OF CAPACITY.

Millilitres	Centilitres	Decilitres	Litres	Dekalitres	Hectolitres	Kilolitre
1	·1	·01	·001	·0001	·00001	·000001
10	1·	·1	01	·001	·0001	·00001
100	10·	1·	·1	·01	·001	·0001
1000	100·	10·	1·	·1	·01	·001
10000	1000·	100·	10·	1·	·1	·01
100000	10000·	1000·	100·	10·	1·	·1
1000000	100000·	10000·	1000·	100·	10·	1·

WEIGHTS.

Milli-grammes	Centi-grammes	Deci-grammes	Grammes	Deka-grammes	Hecto-grammes	Kilo-gramme
1	·1	·01	·001	·0001	·00001	·000001
10	1·	1	·01	·001	·0001	·00001
100	10·	1·	·1	·01	·001	·0001
1000	100·	10·	1·	·1	·01	·001
10000	1000·	100·	10·	1·	·1	·01
100000	10000·	1000·	100·	10·	1·	·1
1000000	100000·	10000·	1000·	100·	10·	1·

METRICAL EQUIVALENTS OF BRITISH UNITS.

LINEAR MEASURE.

British Units		Metrical Equivalents	Metrical Units		British Equivalents
1 inch	=	2·5399541 centimetres	1 millimetre	=	·03937 inches
1 "	=	·02539954 metres	1 centimetre	=	·393708 "
1 foot	=	·30479449 "	1 metre	=	39·37079 "
1 yard	=	·91438348 "	1 "	=	3·2808992 feet
1 fathom	=	1·82876696 "	1 "	=	1·093633 yards
1 pole	=	5·02911 "	1 kilometre	=	1093·63306 "
1 chain	=	20·116437 "	1 "	=	49·71059 chains
1 furlong	=	201·16437 "	1 "	=	3280·89917 feet
1 mile	=	1609·31493 "	1 "	=	·6213824 mile

SQUARE MEASURE.

British Units		Metrical Equivalents	Metrical Units		British Equivalents
1 sq. inch	=	6·451367 sq. centimetres	1 sq. centimetre	=	·1550059 sq. inch
1 " foot	=	·09289968 sq. metre	1 " metre	=	10·7642994 " feet
1 " yard	=	·8360971 " "	1 " "	=	1·1960333 " yards
1 " "	=	·008360971 are	1 are	=	119·60333 " "
1 acre	=	·404671 hectare	1 hectare	=	2·47114 acres
1 sq. mile	=	258·98945 "	1 "	=	·0038612 sq. mile

CUBIC MEASURE.

British Units		Metrical Equivalents	Metrical Units		British Equivalents
1 cubic inch	=	16·3861759 cubic centimetres	1 cubic centimetre	=	·06102705 cubic inch
1 " foot	=	·02831531 " metre	1 " metre	=	35·31658074 " feet
1 " yard	=	·76451342 " "	1 " "	=	1·30802151 " yards

CAPACITY.

British Units		Metrical Equivalents	Metrical Units		British Equivalents
1 cubic inch	=	16·386176 millilitres	1 millilitre	=	·061027 cubic inch
1 " "	=	1·6386176 centilitres	1 centilitre	=	·61027 " "
1 gill	=	14·1983 "	1 "	=	·07043 gill
1 pint	=	·567932 litres	1 litre	=	1·76077 pints
1 quart	=	1·135864 "	1 "	=	·880387 quart
1 gallon	=	4·543458 "	1 "	=	·2200967 gallons
1 "	=	·4543458 dekalitres	1 dekalitre	=	2·20097 "
1 bushel	=	3·634766 "	1 "	=	·275121 bushels
1 "	=	·3634766 hectolitre	1 hectolitre	=	2·75121 "

METRICAL EQUIVALENTS OF BRITISH UNITS.

WEIGHT.

British Units	Metrical Equivalents	Metrical Units	British Equivalents
Avoirdupois			Avoirdupois
1 grain	= 64·79895 milligrammes	1 milligramme	= ·01543235 grains
1 "	= 6·479895 centigrammes	1 centigramme	= ·1543235 "
1 "	= ·06479895 grammes	1 gramme	= 15·43235 "
1 ounce	= 28·34954 "	1 "	= ·0352739 ounces
1 "	= ·02834954 kilogrammes	1 kilogramme	= 35·27394 "
1 pound	= ·45359265 "	1 "	= 2·20462125 pounds
1 hundred-weight	= ·50802377 quintals	1 quintal	= 1·96841 hundred-weights
1 ton	= 1·01604754 milliers or tonnes	1 millier or tonne	= ·98420591 tons

MISCELLANEOUS COMPOUND MEASURES.

British Units	Metrical Equivalents	Metrical Units	British Equivalents
1 foot per second	= ·3048 metres per second	1 metre per second	= 3·2809 feet per second
1 foot per minute	= ·3048 metres per minute	1 metre per minute	= 3·2809 feet per minute
1 mile per hour	= 1·6093 kilometres per hour	1 kilometre per hour	= ·6214 miles per hour
1 pound per foot	= 1·48819 kilogrammes per metre	1 kilogramme per metre	= ·67196 pounds per foot
1 pound per yard	= ·49606 kilogrammes per metre	1 kilogramme per metre	= 2·01587 pounds per yard
1 pound per square inch	= ·07031 kilogrammes per square centimetre	1 kilogramme per square centimetre	= 14·22282 pounds per square inch
1 pound per square foot	= 4·88261 kilogrammes per square metre	1 kilogramme per square metre	= ·20481 pounds per square foot
1 ton per square foot	= 10·93704 tonnes per square metre	1 tonne per square metre	= ·09143 tons per square foot
1 pound per cubic inch	= ·02768 kilogrammes per cubic centimetre	1 kilogramme per cubic centimetre	= 36·1253 pounds per cubic inch
1 pound per cubic foot	= 16·019 kilogrammes per cubic metre	1 kilogramme per cubic metre	= ·0624245 pounds per cubic foot
1 pound per cubic yard	= ·5933 kilogrammes per cubic metre	1 kilogramme per cubic metre	= 1·68546 pounds per cubic yard
1 pound per gallon	= ·09983 kilogrammes per litre	1 kilogramme per litre	= 10·0166 pounds per gallon

DORMAN, LONG & CO. LIMITED.

EQUIVALENTS IN MILLIMETRES

OF INCHES AND FRACTIONS OF AN INCH ADVANCING BY 32NDS.

Inches			0″	1″	2″	3″	4″	5″
...	...	0	...	25·400	50·799	76·199	101·598	126·993
1/32	...	...	·794	26·193	51·593	76·992	102·392	127·791
...	1/16	...	1·537	26·987	52·387	77·786	103·186	128·585
3/32	...	...	2·381	27·781	53·180	78·580	103·979	129·379
...	...	1/8	3·175	28·574	53·974	79.374	104·773	130·173
5/32	...	...	3·969	29·368	54·768	80·167	105·567	130·966
...	3/16	...	4·762	30·162	55·561	80·961	105·361	131·760
7/32	...	...	5·556	30·956	56·355	81·755	107·154	132·554
...	...	1/4	6·350	31·749	57·149	82·549	107·948	133·348
9/32	...	...	7·144	32·543	57·943	83·342	108·742	134·141
...	5/16	...	7·937	33·337	58·736	84·136	109·536	134·935
11/32	...	...	8·731	34·131	59·530	84·930	110·329	135·729
...	...	3/8	9·525	34·924	60·324	85·723	111·123	136·523
13/32	...	...	10·319	35·718	61·118	86·517	111·917	137·316
...	7/16	...	11·112	36·512	61·911	87·311	112·710	138·110
15/32	...	...	11·906	37·306	62·705	88·105	113·504	138·904
...	...	1/2	12·700	38·099	63·499	88·898	114·298	139·697
17/32	...	...	13·494	38·893	64·293	89·692	115·092	140·491
...	9/16	...	14·287	39·687	65·086	90·486	115·885	141·285
19/32	...	...	15·081	40·481	65·880	91·280	116·679	142·079
...	...	5/8	15·875	41·274	66·674	92·073	117·473	142·872
21/32	...	...	16·668	42·068	67·468	92·867	118·267	143·666
...	11/16	...	17·462	42·862	68·261	93·661	119·060	144·460
23/32	...	...	18·256	43·655	69·055	94·455	119·854	145·254
...	...	3/4	19·050	44·449	69·849	95·248	120·648	146·047
25/32	...	...	19·843	45·243	70·642	96·042	121·442	146·841
...	13/16	...	20·637	46·037	71·436	96·836	122·235	147·635
27/32	...	...	21·431	46·830	72·230	97·629	123·029	148·429
...	...	7/8	22·225	47·624	73·024	98·423	123·823	149·222
29/32	...	...	23·018	48·418	73·817	99·217	124·616	150·016
...	15/16	...	23·812	49·212	74·611	100·011	125·410	150·810
31/32	...	...	24·606	50·005	75·405	100·804	126·204	151·604

12 Inches = 304·794 Millimetres.

DORMAN, LONG & CO. LIMITED.

EQUIVALENTS IN MILLIMETRES

OF INCHES AND FRACTIONS OF AN INCH ADVANCING BY 32NDS.

Inches			6″	7″	8″	9″	10″	11″
...	...	0	152·307	177·797	203·196	228·596	253·995	279·395
$\frac{1}{32}$	...	...	153·191	178·591	203·990	229·390	254·789	280·189
...	$\frac{1}{16}$	...	153·985	179·384	204·784	230·183	255·583	280·982
$\frac{3}{32}$	...	...	154·778	180·178	205·578	230·977	256·377	281·776
...	...	$\frac{1}{8}$	155·572	180·972	206·371	231·771	257·170	282·570
$\frac{5}{32}$	...	...	156·366	181·765	207·165	232·565	257·964	283·364
...	$\frac{3}{16}$	...	157·160	182·559	207·959	233·358	258·758	284·157
$\frac{7}{32}$	...	...	157·953	183·353	208·752	234·152	259·552	284·951
...	...	$\frac{1}{4}$	158·747	184·147	209·546	234·946	260·345	285·745
$\frac{9}{32}$	...	...	159·541	184·940	210·340	235·739	261·139	286·539
...	$\frac{5}{16}$	...	160·335	185·734	211·134	236·533	261·933	287·332
$\frac{11}{32}$	...	...	161·128	186·528	211·927	237·327	262·727	288·126
...	...	$\frac{3}{8}$	161·922	187·322	212·721	238·121	263·520	288·920
$\frac{13}{32}$	...	...	162·716	188·115	213·515	238·914	264·314	289·714
...	$\frac{7}{16}$	...	163·510	188·909	214·309	239·708	265·108	290·507
$\frac{15}{32}$	...	...	164·303	189·703	215·102	240·502	265·901	291·301
...	...	$\frac{1}{2}$	165·097	190·497	215·896	241·296	266·695	292·095
$\frac{17}{32}$	...	...	165·891	191·290	216·690	242·089	267·489	292·888
...	$\frac{9}{16}$	...	166·684	192·084	217·484	242·883	268·283	293·682
$\frac{19}{32}$	...	...	167·478	192·878	218·277	243·677	269·076	294·476
...	...	$\frac{5}{8}$	168·272	193·672	219·071	244·471	269·870	295·270
$\frac{21}{32}$	...	...	169·066	194·465	219·865	245·264	270·664	296·063
...	$\frac{11}{16}$	...	169·859	195·259	220·659	246·058	271·458	296·857
$\frac{23}{32}$	...	...	170·653	196·053	221·452	246·852	272·251	297·651
...	...	$\frac{3}{4}$	171·447	196·846	222·246	247·646	273·045	298·445
$\frac{25}{32}$	...	...	172·241	197·640	223·040	248·439	273·839	299·238
...	$\frac{13}{16}$	...	173·034	198·434	223·833	249·233	274·633	300·032
$\frac{27}{32}$	...	...	173·828	199·228	224·627	250·027	275·426	300·826
...	...	$\frac{7}{8}$	174·622	200·021	225·421	250·820	276·220	301·620
$\frac{29}{32}$	...	...	175·416	200·815	226·215	251·614	277·014	302·413
...	$\frac{15}{16}$	...	176·209	201·609	227·008	252·408	277·807	303·207
$\frac{31}{32}$	...	...	177·003	202·403	227·802	253·202	278·601	304·001

12 Inches = 304·794 Millimetres.

EQUIVALENTS OF MILLIMETRES IN INCHES.

Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches	Milli-metres	Inches
1	·039	51	2·008	101	3·976	151	5·945	201	7·913
2	·079	52	2·047	102	4·016	152	5·984	202	7·953
3	·118	53	2·087	103	4·055	153	6·024	203	7·992
4	·157	54	2·126	104	4·095	154	6·063	204	8·032
5	·197	55	2·165	105	4·134	155	6·102	205	8·071
6	·236	56	2·205	106	4·173	156	6·142	206	8·110
7	·276	57	2·244	107	4·213	157	6·181	207	8·150
8	·315	58	2·283	108	4·252	158	6·221	208	8·189
9	·354	59	2·323	109	4·291	159	6·260	209	8·228
10	·394	60	2·362	110	4·331	160	6·299	210	8·268
11	·433	61	2·402	111	4·370	161	6·339	211	8·307
12	·472	62	2·441	112	4·409	162	6·378	212	8·347
13	·512	63	2·480	113	4·449	163	6·417	213	8·386
14	·551	64	2·520	114	4·488	164	6·457	214	8·425
15	·591	65	2·559	115	4·528	165	6·496	215	8·465
16	·630	66	2·598	116	4·567	166	6·535	216	8·504
17	·669	67	2·638	117	4·606	167	6·575	217	8·543
18	·709	68	2·677	118	4·646	168	6·614	218	8·583
19	·748	69	2·717	119	4·685	169	6·654	219	8·622
20	·787	70	2·756	120	4·724	170	6·693	220	8·661
21	·827	71	2·795	121	4·764	171	6·732	221	8·701
22	·866	72	2·835	122	4·803	172	6·772	222	8·740
23	·906	73	2·874	123	4·843	173	6·811	223	8·780
24	·945	74	2·913	124	4·882	174	6·850	224	8·819
25	·984	75	2·953	125	4·921	175	6·890	225	8·858
26	1·024	76	2·992	126	4·961	176	6·929	226	8·898
27	1·063	77	3·032	127	5·000	177	6·969	227	8·937
28	1·102	78	3·071	128	5·039	178	7·008	228	8·976
29	1·142	79	3·110	129	5·079	179	7·047	229	9·016
30	1·181	80	3·150	130	5·118	180	7·087	230	9·055
31	1·220	81	3·189	131	5·158	181	7·126	231	9·095
32	1·260	82	3·228	132	5·197	182	7·165	232	9·134
33	1·299	83	3·268	133	5·236	183	7·205	233	9·173
34	1·339	84	3·307	134	5·276	184	7·244	234	9·213
35	1·378	85	3·346	135	5·315	185	7·284	235	9·252
36	1·417	86	3·386	136	5·354	186	7·323	236	9·291
37	1·457	87	3·425	137	5·394	187	7·362	237	9·331
38	1·496	88	3·465	138	5·433	188	7·402	238	9·370
39	1·535	89	3·504	139	5·472	189	7·441	239	9·410
40	1·575	90	3·543	140	5·512	190	7·480	240	9·449
41	1·614	91	3·583	141	5·551	191	7·520	241	9·488
42	1·654	92	3·622	142	5·591	192	7·559	242	9·528
43	1·693	93	3·661	143	5·630	193	7·598	243	9·567
44	1·732	94	3·701	144	5·669	194	7·638	244	9·606
45	1·772	95	3·740	145	5·709	195	7·677	245	9·646
46	1·811	96	3·780	146	5·748	196	7·717	246	9·685
47	1·850	97	3·819	147	5·787	197	7·756	247	9·724
48	1·890	98	3·858	148	5·827	198	7·795	248	9·764
49	1·929	99	3·898	149	5·866	199	7·835	249	9·803
50	1·969	100	3·937	150	5·906	200	7·874	250	9·843

EQUIVALENTS OF MILLIMETRES IN INCHES.

Millimetres	Inches	Millimetres	Inches	Millimetres	Inches	Millimetres	Inches	Millimetres	Inches
251	9·882	301	11·850	351	13·819	401	15·788	451	17·756
252	9·921	302	11·890	352	13·858	402	15·827	452	17·795
253	9·961	303	11·929	353	13·898	403	15·866	453	17·835
254	10·000	304	11·969	354	13·937	404	15·906	454	17·874
255	10·039	305	12·008	355	13·977	405	15·945	455	17·914
256	10·079	306	12·047	356	14·016	406	15·984	456	17·953
257	10·118	307	12·087	357	14·055	407	16·024	457	17·992
258	10·158	308	12·126	358	14·095	408	16·063	458	18·032
259	10·197	309	12·165	359	14·134	409	16·103	459	18·071
260	10·236	310	12·205	360	14·173	410	16·142	460	18·110
261	10·276	311	12·244	361	14·213	411	16·181	461	18·150
262	10·315	312	12·284	362	14·252	412	16·221	462	18·189
263	10·354	313	12·323	363	14·291	413	16·260	463	18·229
264	10·394	314	12·362	364	14·331	414	16·299	464	18·268
265	10·433	315	12·402	365	14·370	415	16·339	465	18·307
266	10·473	316	12·441	366	14·410	416	16·378	466	18·347
267	10·512	317	12·480	367	14·449	417	16·417	467	18·386
268	10·551	318	12·520	368	14·488	418	16·457	468	18·425
269	10·591	319	12·559	369	14·528	419	16·496	469	18·465
270	10·630	320	12·599	370	14·567	420	16·536	470	18·504
271	10·669	321	12·638	371	14·606	421	16·575	471	18·543
272	10·709	322	12·677	372	14·646	422	16·614	472	18·583
273	10·748	323	12·717	373	14·685	423	16·654	473	18·622
274	10·787	324	12·756	374	14·725	424	16·693	474	18·662
275	10·827	325	12·795	375	14·764	425	16·732	475	18·701
276	10·866	326	12·835	376	14·803	426	16·772	476	18·740
277	10·906	327	12·874	377	14·843	427	16·811	477	18·780
278	10·945	328	12·913	378	14·882	428	16·851	478	18·819
279	10·984	329	12·953	379	14·921	429	16·890	479	18·858
280	11·024	330	12·992	380	14·961	430	16·929	480	18·898
281	11·063	331	13·032	381	15·000	431	16·969	481	18·937
282	11·102	332	13·071	382	15·040	432	17·008	482	18·977
283	11·142	333	13·110	383	15·079	433	17·047	483	19·016
284	11·181	334	13·150	384	15·118	434	17·087	484	19·055
285	11·221	335	13·189	385	15·158	435	17·126	485	19·095
286	11·260	336	13·228	386	15·197	436	17·166	486	19·134
287	11·299	337	13·268	387	15·236	437	17·205	487	19·173
288	11·339	338	13·307	388	15·276	438	17·244	488	19·213
289	11·378	339	13·347	389	15·315	439	17·284	489	19·252
290	11·417	340	13·386	390	15·354	440	17·323	490	19·292
291	11·457	341	13·425	391	15·394	441	17·362	491	19·331
292	11·496	342	13·465	392	15·433	442	17·402	492	19·370
293	11·536	343	13·504	393	15·473	443	17·441	493	19·410
294	11·575	344	13·543	394	15·512	444	17·480	494	19·449
295	11·614	345	13·583	395	15·551	445	17·520	495	19·488
296	11·654	346	13·622	396	15·591	446	17·559	496	19·528
297	11·693	347	13·662	397	15·630	447	17·599	497	19·567
298	11·732	348	13·701	398	15·669	448	17·638	498	19·606
299	11·772	349	13·740	399	15·709	449	17·677	499	19·646
300	11·811	350	13·780	400	15·748	450	17·717	500	19·685

EQUIVALENTS OF MILLIMETRES IN INCHES.

Millimetres	Inches	Millimetres	Inches	Millimetres	Inches	Millimetres	Inches	Millimetres	Inches
501	19·725	551	21·693	601	23·662	651	25·630	701	27·599
502	19·764	552	21·732	602	23·701	652	25·670	702	27·638
503	19·803	553	21·772	603	23·740	653	25·709	703	27·677
504	19·843	554	21·811	604	23·780	654	25·748	704	27·717
505	19·882	555	21·851	605	23·819	655	25·788	705	27·756
506	19·921	556	21·890	606	23·858	656	25·827	706	27·796
507	19·961	557	21·929	607	23·898	657	25·866	707	27·835
508	20·000	558	21·969	608	23·937	658	25·906	708	27·874
509	20·040	559	22·008	609	23·977	659	25·945	709	27·914
510	20·079	560	22·047	610	24·016	660	25·984	710	27·953
511	20·118	561	22·087	611	24·055	661	26·024	711	27·992
512	20·158	562	22·126	612	24·095	662	26·063	712	28·032
513	20·197	563	22·166	613	24·134	663	26·103	713	28·071
514	20·236	564	22·205	614	24·173	664	26·142	714	28·110
515	20·276	565	22·244	615	24·213	665	26·181	715	28·150
516	20·315	566	22·284	616	24·252	666	26·221	716	28·189
517	20·355	567	22·323	617	24·292	667	26·260	717	28·229
518	20·394	568	22·362	618	24·331	668	26·299	718	28·268
519	20·433	569	22·402	619	24·370	669	26·339	719	28·307
520	20·473	570	22·441	620	24·410	670	26·378	720	28·347
521	20·512	571	22·481	621	24·449	671	26·418	721	28·386
522	20·551	572	22·520	622	24·488	672	26·457	722	28·425
523	20·591	573	22·559	623	24·528	673	26·496	723	28·465
524	20·630	574	22·599	624	24·567	674	26·536	724	28·504
525	20·669	575	22·638	625	24·607	675	26·575	725	28·544
526	20·709	576	22·677	626	24·646	676	26·614	726	28·583
527	20·748	577	22·717	627	24·685	677	26·654	727	28·622
528	20·788	578	22·756	628	24·725	678	26·693	728	28·662
529	20·827	579	22·795	629	24·764	679	26·733	729	28·701
530	20·866	580	22·835	630	24·803	680	26·772	730	28·740
531	20·906	581	22·874	631	24·843	681	26·811	731	28·780
532	20·945	582	22·914	632	24·882	682	26·851	732	28·819
533	20·984	583	22·953	633	24·921	683	26·890	733	28·859
534	21·024	584	22·992	634	24·961	684	26·929	734	28·898
535	21·063	585	23·032	635	25·000	685	26·969	735	28·937
536	21·103	586	23·071	636	25·040	686	27·008	736	28·977
537	21·142	587	23·110	637	25·079	687	27·047	737	29·016
538	21·181	588	23·150	638	25·118	688	27·087	738	29·055
539	21·221	589	23·189	639	25·158	689	27·126	739	29·095
540	21·260	590	23·229	640	25·197	690	27·166	740	29·134
541	21·299	591	23·268	641	25·236	691	27·205	741	29·173
542	21·339	592	23·307	642	25·276	692	27·244	742	29·213
543	21·378	593	23·347	643	25·315	693	27·284	743	29·252
544	21·418	594	23·385	644	25·355	694	27·323	744	29·292
545	21·457	595	23·424	645	25·394	695	27·362	745	29·331
546	21·496	596	23·464	646	25·433	696	27·402	746	29·370
547	21·536	597	23·503	647	25·473	697	27·441	747	29·410
548	21·575	598	23·543	648	25·512	698	27·481	748	29·449
549	21·614	599	23·582	649	25·551	699	27·520	749	29·488
550	21·654	600	23·622	650	25·591	700	27·559	750	29·528

DORMAN, LONG & CO. LIMITED.

EQUIVALENTS OF MILLIMETRES IN INCHES.

Millimetres	Inches	Millimetres	Inches	Millimetres	Inches	Millimetres	Inches	Millimetres	Inches
751	29·567	801	31·535	851	33·504	901	35·472	951	37·441
752	29·606	802	31·575	852	33·543	902	35·512	952	37·480
753	29·646	803	31·614	853	33·583	903	35·551	953	37·520
754	29·685	804	31·654	854	33·622	904	35·591	954	37·559
755	29·724	805	31·693	855	33·661	905	35·630	955	37·598
756	29·764	806	31·732	856	33·701	906	35·669	956	37·638
757	29·803	807	31·772	857	33·740	907	35·709	957	37·677
758	29·843	808	31·811	858	33·780	908	35·748	958	37·717
759	29·882	809	31·850	859	33·819	909	35·787	959	37·756
760	29·921	810	31·890	860	33·858	910	35·827	960	37·795
761	29·961	811	31·929	861	33·898	911	35·866	961	37·835
762	30·000	812	31·969	862	33·937	912	35·906	962	37·874
763	30·039	813	32·008	863	33·976	913	35·945	963	37·913
764	30·079	814	32·047	864	34·016	914	35·984	964	37·953
765	30·118	815	32·087	865	34·055	915	36·024	965	37·992
766	30·157	816	32·126	866	34·094	916	36·063	966	38·032
767	30·197	817	32·165	867	34·134	917	36·102	967	38·071
768	30·236	818	32·205	868	34·173	918	36·142	968	38·110
769	30·276	819	32·244	869	34·213	919	36·181	969	38·150
770	30·315	820	32·283	870	34·252	920	36·220	970	38·189
771	30·354	821	32·323	871	34·291	921	36·260	971	38·228
772	30·394	822	32·362	872	34·331	922	36·299	972	38·268
773	30·433	823	32·402	873	34·370	923	36·339	973	38·307
774	30·472	824	32·441	874	34·409	924	36·378	974	38·346
775	30·512	825	32·480	875	34·449	925	36·417	975	38·386
776	30·551	826	32·520	876	34·488	926	36·457	976	38·425
777	30·591	827	32·559	877	34·528	927	36·496	977	38·465
778	30·630	828	32·598	878	34·567	928	36·535	978	38·504
779	30·669	829	32·638	879	34·606	929	36·575	979	38·543
780	30·709	830	32·677	880	34·646	930	36·614	980	38·583
781	30·748	831	32·717	881	34·685	931	36·654	981	38·622
782	30·787	832	32·756	882	34·724	932	36·693	982	38·661
783	30·827	833	32·795	883	34·764	933	36·732	983	38·701
784	30·866	834	32·835	884	34·803	934	36·772	984	38·740
785	30·906	835	32·874	885	34·843	935	36·811	985	38·780
786	30·945	836	32·913	886	34·882	936	36·850	986	38·819
787	30·984	837	32·953	887	34·921	937	36·890	987	38·858
788	31·024	838	32·992	888	34·961	938	36·929	988	38·898
789	31·063	839	33·031	889	35·000	939	36·969	989	38·937
790	31·102	840	33·071	890	35·039	940	37·008	990	38·976
791	31·142	841	33·110	891	35·079	941	37·047	991	39·016
792	31·181	842	33·150	892	35·118	942	37·087	992	39·055
793	31·220	843	33·189	893	35·157	943	37·126	993	39·094
794	31·260	844	33·228	894	35·197	944	37·165	994	39·134
795	31·299	845	33·268	895	35·236	945	37·205	995	39·173
796	31·339	846	33·307	896	35·276	946	37·244	996	39·213
797	31·378	847	33·346	897	35·315	947	37·283	997	39·252
798	31·417	848	33·386	898	35·354	948	37·323	998	39·291
799	31·457	849	33·425	899	35·394	949	37·362	999	39·331
800	31·496	850	33·465	900	35·433	950	37·402	1000	39·370

EQUIVALENTS OF METRES IN FEET.

1 Metre = 3·280899 Feet.

Metres	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	3·2809	3·6090	3·9371	4·2652	4·5933	4·9213	5·2494	5·5775	5·9056	6·2337
2	6·5618	6·8899	7·2180	7·5461	7·8742	8·2022	8·5303	8·8584	9·1865	9·5146
3	9·8427	10·1708	10·4989	10·8270	11·1551	11·4831	11·8112	12·1393	12·4674	12·7955
4	13·1236	13·4517	13·7798	14·1079	14·4360	14·7640	15·0921	15·4202	15·7483	16·0764
5	16·4045	16·7326	17·0607	17·3888	17·7169	18·0449	18·3730	18·7011	19·0292	19·3573
6	19·6854	20·0135	20·3416	20·6697	20·9978	21·3258	21·6539	21·9820	22·3101	22·6382
7	22·9663	23·2944	23·6225	23·9506	24·2787	24·6067	24·9348	25·2629	25·5910	25·9191
8	26·2472	26·5753	26·9034	27·2315	27·5596	27·8876	28·2157	28·5438	28·8719	29·2000
9	29·5281	29·8562	30·1843	30·5124	30·8405	31·1685	31·4966	31·8247	32·1528	32·4809
10	32·8090	33·1371	33·4652	33·7933	34·1213	34·4494	34·7775	35·1056	35·4337	35·7618

EQUIVALENTS OF FEET IN METRES.

1 Foot = ·3047945 of 1 Metre.

Feet	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	·30480	·33527	·36575	·39623	·42671	·45719	·48767	·51815	·54863	·57911
2	·60959	·64007	·67055	·70103	·73151	·76199	·79247	·82294	·85342	·88390
3	·91438	·94486	·97534	1·00582	1·03630	1·06678	1·09726	1·12774	1·15822	1·18870
4	1·21918	1·24966	1·28014	1·31062	1·34110	1·37158	1·40205	1·43253	1·46301	1·49349
5	1·52397	1·55445	1·58493	1·61541	1·64589	1·67637	1·70685	1·73733	1·76781	1·79829
6	1·82877	1·85925	1·88973	1·92020	1·95068	1·98116	2·01164	2·04212	2·07260	2·10308
7	2·13356	2·16404	2·19452	2·22500	2·25548	2·28596	2·31644	2·34692	2·37740	2·40788
8	2·43836	2·46884	2·49931	2·52979	2·56027	2·59075	2·62123	2·65171	2·68219	2·71267
9	2·74315	2·77363	2·80411	2·83459	2·86507	2·89555	2·92603	2·95651	2·98699	3·01747
10	3·04794	3·07842	3·10890	3·13938	3·16986	3·20034	3·23082	3·26130	3·29178	3·32226

EQUIVALENTS OF SQUARE CENTIMETRES IN SQUARE INCHES.

1 Square Centimetre = ·1550059 of 1 Square Inch.

Square Cent.	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	·15501	·17051	·18601	·20151	·21701	·23251	·24801	·26351	·27901	·29451
2	·31001	·32551	·34101	·35651	·37201	·38751	·40301	·41852	·43402	·44952
3	·46502	·48052	·49602	·51152	·52702	·54252	·55802	·57352	·58902	·60452
4	·62002	·63552	·65102	·66652	·68203	·69753	·71303	·72853	·74403	·75953
5	·77503	·79053	·80603	·82153	·83703	·85253	·86803	·88353	·89903	·91453
6	·93004	·94554	·96104	·97654	·99204	1·00754	1·02304	1·03854	1·05404	1·06954
7	1·08504	1·10054	1·11604	1·13154	1·14704	1·16254	1·17804	1·19355	1·20905	1·22455
8	1·24005	1·25555	1·27105	1·28655	1·30205	1·31755	1·33305	1·34855	1·36405	1·37955
9	1·39505	1·41055	1·42605	1·44156	1·45706	1·47256	1·48806	1·50356	1·51906	1·53456
10	1·55006	1·56556	1·58106	1·59656	1·61206	1·62756	1·64306	1·65856	1·67406	1·68956

EQUIVALENTS OF SQUARE INCHES IN SQUARE CENTIMETRES.

1 Square Inch = 6·451367 Square Centimetres.

Square Inches	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	6·4514	7·0965	7·7416	8·3868	9·0319	9·6770	10·3222	10·9673	11·6125	12·2576
2	12·9027	13·5479	14·1930	14·8381	15·4833	16·1284	16·7736	17·4187	18·0638	18·7090
3	19·3541	19·9992	20·6444	21·2895	21·9346	22·5798	23·2249	23·8701	24·5152	25·1603
4	25·8055	26·4506	27·0957	27·7409	28·3860	29·0312	29·6763	30·3214	30·9666	31·6117
5	32·2568	32·9020	33·5471	34·1922	34·8374	35·4825	36·1277	36·7728	37·4179	38·0631
6	38·7082	39·3533	39·9985	40·6436	41·2887	41·9339	42·5790	43·2242	43·8693	44·5144
7	45·1596	45·8047	46·4498	47·0950	47·7401	48·3853	49·0304	49·6755	50·3207	50·9658
8	51·6109	52·2561	52·9012	53·5463	54·1915	54·8366	55·4818	56·1269	56·7720	57·4172
9	58·0623	58·7074	59·3526	59·9977	60·6428	61·2880	61·9331	62·5783	63·2234	63·8685
10	64·5137	65·1588	65·8039	66·4491	67·0942	67·7394	68·3845	69·0296	69·6748	70·3199

EQUIVALENTS OF SQUARE METRES IN SQUARE FEET.

Square Metre = 10·764299 Square Feet.

Square Metres	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	10·764	11·841	12·917	13·994	15·070	16·146	17·223	18·299	19·376	20·452
2	21·529	22·605	23·681	24·758	25·834	26·911	27·987	29·064	30·140	31·216
3	32·293	33·369	34·446	35·522	36·599	37·675	38·751	39·828	40·904	41·981
4	43·057	44·134	45·210	46·286	47·363	48·439	49·516	50·592	51·669	52·745
5	53·821	54·898	55·974	57·051	58·127	59·204	60·280	61·356	62·433	63·509
6	64·586	65·662	66·739	67·815	68·892	69·968	71·044	72·121	73·197	74·274
7	75·350	76·427	77·503	78·579	79·656	80·732	81·809	82·885	83·962	85·038
8	86·114	87·191	88·267	89·344	90·420	91·497	92·573	93·649	94·726	95·802
9	96·879	97·955	99·032	100·108	101·184	102·261	103·337	104·414	105·490	106·567
10	107·643	108·719	109·796	110·872	111·949	113·025	114·102	115·178	116·254	117·331

EQUIVALENTS OF SQUARE FEET IN SQUARE METRES.

1 Square Foot = ·0928997 of a Square Metre.

Square Feet	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	·09290	·10219	·11148	·12077	·13006	·13935	·14864	·15793	·16722	·17651
2	·18580	·19509	·20438	·21367	·22296	·23225	·24154	·25083	·26012	·26941
3	·27870	·28799	·29728	·30657	·31586	·32515	·33444	·34373	·35302	·36231
4	·37160	·38039	·39018	·39947	·40876	·41805	·42734	·43663	·44592	·45521
5	·46450	·47379	·48308	·49237	·50166	·51095	·52024	·52953	·53882	·54811
6	·55740	·56669	·57598	·58527	·59456	·60385	·61314	·62243	·63172	·64101
7	·65030	·65959	·66888	·67817	·68746	·69675	·70604	·71533	·72462	·73391
8	·74320	·75249	·76178	·77107	·78036	·78965	·79894	·80823	·81752	·82681
9	·83610	·84539	·85468	·86397	·87326	·88255	·89184	·90113	·91042	·91971
10	·92900	·93829	·94758	·95687	·96616	·97545	·98474	·99403	1·00332	1·01261

EQUIVALENTS OF CUBIC CENTIMETRES IN CUBIC INCHES.

1 Cubic Centimetre = ·06102705 of a Cubic Inch.

Cubic Cent.	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	·061027	·067130	·073232	·079335	·085438	·091541	·097643	·103746	·109849	·115951
2	·122054	·128157	·134260	·140362	·146465	·152568	·158670	·164773	·170876	·176978
3	·183081	·189184	·195287	·201389	·207492	·213595	·219697	·225800	·231903	·238005
4	·244108	·250211	·256314	·262416	·268519	·274622	·280724	·286827	·292930	·299033
5	·305135	·311238	·317341	·323443	·329546	·335649	·341751	·347854	·353957	·360060
6	·366162	·372265	·378368	·384470	·390573	·396676	·402779	·408881	·414984	·421087
7	·427189	·433292	·439395	·445497	·451600	·457703	·463806	·469908	·476011	·482114
8	·488216	·494319	·500422	·506525	·512627	·518730	·524833	·530935	·537038	·543141
9	·549243	·555346	·561449	·567552	·573654	·579757	·585860	·591962	·598065	·604168
10	·610271	·616373	·622476	·628579	·634681	·640784	·646887	·652989	·659092	·665195

EQUIVALENTS OF CUBIC INCHES IN CUBIC CENTIMETRES.

1 Cubic Inch = 16·386176 Cubic Centimetres.

Cubic Ins.	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	16·386	18·025	19·663	21·302	22·941	24·579	26·218	27·856	29·495	31·134
2	32·772	34·411	36·050	37·688	39·327	40·965	42·604	44·243	45·881	47·520
3	49·158	50·797	52·436	54·074	55·713	57·352	58·990	60·629	62·267	63·906
4	65·545	67·183	68·822	70·461	72·099	73·738	75·376	77·015	78·654	80·292
5	81·931	83·569	85·208	86·847	88·485	90·124	91·763	93·401	95·040	96·678
6	98·317	99·956	101·594	103·233	104·872	106·510	108·149	109·787	111·426	113·065
7	114·703	116·342	117·980	119·619	121·258	122·896	124·535	126·174	127·812	129·451
8	131·089	132·728	134·367	136·005	137·644	139·282	140·921	142·560	144·198	145·837
9	147·476	149·114	150·753	152·391	154·030	155·669	157·307	158·946	160·585	162·223
10	163·862	165·500	167·139	168·778	170·416	172·055	173·693	175·332	176·971	178·609

EQUIVALENTS OF CUBIC METRES IN CUBIC FEET.

1 Cubic Metre = 35·31658 Cubic Feet.

Cubic Metres	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	35·317	38·848	42·380	45·912	49·443	52·975	56·507	60·038	63·570	67·101
2	70·633	74·165	77·696	81·228	84·760	88·291	91·823	95·355	98·886	102·418
3	105·950	109·481	113·013	116·545	120·076	123·608	127·140	130·671	134·203	137·735
4	141·266	144·798	148·330	151·861	155·393	158·925	162·456	165·988	169·520	173·051
5	176·583	180·115	183·646	187·178	190·710	194·241	197·773	201·305	204·836	208·368
6	211·899	215·431	218·963	222·494	226·026	229·558	233·089	236·621	240·153	243·684
7	247·216	250·748	254·279	257·811	261·343	264·874	268·406	271·938	275·469	279·001
8	282·533	286·064	289·596	293·128	296·659	300·191	303·723	307·254	310·786	314·318
9	317·849	321·381	324·913	328·444	331·976	335·508	339·039	342·571	346·103	349·634
10	353·166	356·697	360·229	363·761	367·292	370·824	374·356	377·887	381·419	384·951

DORMAN, LONG & CO. LIMITED.

EQUIVALENTS OF CUBIC FEET IN CUBIC METRES.

1 Cubic Foot = ·02831531 of a Cubic Metre.

Cubic Feet	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	·028315	·031147	·033978	·036810	·039641	·042473	·045304	·048136	·050968	·05379
2	·056631	·059462	·062294	·065125	·067957	·070788	·073620	·076451	·079283	·08211
3	·084946	·087777	·090609	·093441	·096272	·099104	·101935	·104767	·107598	·11043
4	·113261	·116093	·118924	·121756	·124587	·127419	·130250	·133082	·135913	·13874
5	·141577	·144408	·147240	·150071	·152903	·155734	·158566	·161397	·164229	·16706
6	·169892	·172723	·175555	·178386	·181218	·184050	·186881	·189713	·192544	·19537
7	·198207	·201039	·203870	·206702	·209533	·212365	·215196	·218028	·220859	·22369
8	·226522	·229354	·232186	·235017	·237849	·240680	·243512	·246343	·249175	·25200
9	·254838	·257669	·260501	·263332	·266164	·268995	·271827	·274659	·277490	·28032
10	·283153	·285985	·288816	·291648	·294479	·297311	·300142	·302974	·305805	·30863

EQUIVALENTS OF KILOGRAMMES IN POUNDS.

1 Kilogramme = 2·20462125 Pounds.

Kilo-grammes	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	2·2046	2·4251	2·6455	2·8660	3·0865	3·3069	3·5274	3·7479	3·9683	4·1888
2	4·4092	4·6297	4·8502	5·0706	5·2911	5·5116	5·7320	5·9525	6·1729	6·3934
3	6·6139	6·8343	7·0548	7·2752	7·4957	7·7162	7·9366	8·1571	8·3776	8·5980
4	8·8185	9·0389	9·2594	9·4799	9·7003	9·9208	10·1413	10·3617	10·5822	10·8026
5	11·0231	11·2436	11·4640	11·6845	11·9050	12·1254	12·3459	12·5663	12·7868	13·0073
6	13·2277	13·4482	13·6687	13·8891	14·1096	14·3300	14·5505	14·7710	14·9914	15·2119
7	15·4323	15·6528	15·8733	16·0937	16·3142	16·5347	16·7551	16·9756	17·1960	17·4165
8	17·6370	17·8574	18·0779	18·2984	18·5188	18·7393	18·9597	19·1802	19·4007	19·6211
9	19·8416	20·0621	20·2825	20·5030	20·7234	20·9439	21·1644	21·3848	21·6053	21·8258
10	22·0462	22·2667	22·4871	22·7076	22·9281	23·1485	23·3690	23·5894	23·8099	24·0304

EQUIVALENTS OF POUNDS IN KILOGRAMMES.

1 Pound = ·45359265 of a Kilogramme.

Pounds	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	·45359	·49895	·54431	·58967	·63503	·68039	·72575	·77111	·81647	·86183
2	·90719	·95254	·99790	1·04326	1·08862	1·13398	1·17934	1·22470	1·27006	1·31542
3	1·36078	1·40614	1·45150	1·49686	1·54222	1·58757	1·63293	1·67829	1·72365	1·76901
4	1·81437	1·85973	1·90509	1·95045	1·99581	2·04117	2·08653	2·13189	2·17724	2·22260
5	2·26796	2·31332	2·35868	2·40404	2·44940	2·49476	2·54012	2·58548	2·63084	2·67620
6	2·72156	2·76692	2·81227	2·85763	2·90299	2·94835	2·99371	3·03907	3·08443	3·12979
7	3·17515	3·22051	3·26587	3·31123	3·35659	3·40194	3·44730	3·49266	3·53802	3·58338
8	3·62874	3·67410	3·71946	3·76482	3·81018	3·85554	3·90090	3·94626	3·99162	4·03697
9	4·08233	4·12769	4·17305	4·21841	4·26377	4·30913	4·35449	4·39985	4·44521	4·49057
10	4·53593	4·58129	4·62664	4·67200	4·71736	4·76272	4·80808	4·85344	4·89880	4·94416

EQUIVALENTS OF KILOGRAMMES PER SQUARE CENTIMETRE IN POUNDS PER SQUARE INCH.

1 Kilogramme per Square Centimetre = 14·22282 Pounds per Square Inch.

Kilogram's per Square Centimetre	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	14·223	15·645	17·067	18·490	19·912	21·334	22·757	24·179	25·601	27·023
2	28·446	29·868	31·290	32·712	34·135	35·557	36·979	38·402	39·824	41·246
3	42·668	44·091	45·513	46·935	48·358	49·780	51·202	52·624	54·047	55·469
4	56·891	58·314	59·736	61·158	62·580	64·003	65·425	66·847	68·270	69·692
5	71·114	72·536	73·959	75·381	76·803	78·226	79·648	81·070	82·492	83·915
6	85·337	86·759	88·181	89·604	91·026	92·448	93·871	95·293	96·715	98·137
7	99·560	100·982	102·404	103·827	105·249	106·671	108·093	109·516	110·938	112·360
8	113·783	115·205	116·627	118·049	119·472	120·894	122·316	123·739	125·161	126·583
9	128·005	129·428	130·850	132·272	133·695	135·117	136·539	137·961	139·384	140·806
10	142·228	143·650	145·073	146·495	147·917	149·340	150·762	152·184	153·606	155·029

EQUIVALENTS OF POUNDS PER SQUARE INCH IN KILOGRAMMES PER SQUARE CENTIMETRE.

1 Pound per Square Inch = ·07030954 of a Kilogramme per Square Centimetre.

Pounds	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	·070310	·077340	·084371	·091402	·098433	·105464	·112495	·119526	·126557	·133588
2	·140619	·147650	·154681	·161712	·168743	·175774	·182805	·189836	·196867	·203898
3	·210929	·217960	·224991	·232021	·239052	·246083	·253114	·260145	·267176	·274207
4	·281238	·288269	·295300	·302331	·309362	·316393	·323424	·330455	·337486	·344517
5	·351548	·358579	·365610	·372641	·379672	·386702	·393733	·400764	·407795	·414826
6	·421857	·428888	·435919	·442950	·449981	·457012	·464043	·471074	·478105	·485136
7	·492167	·499198	·506229	·513260	·520291	·527322	·534353	·541383	·548414	·555445
8	·562476	·569507	·576538	·583569	·590600	·597631	·604662	·611693	·618724	·625755
9	·632786	·639817	·646848	·653879	·660910	·667941	·674972	·682003	·689033	·696064
10	·703095	·710126	·717157	·724188	·731219	·738250	·745281	·752312	·759343	·766374

EQUIVALENTS OF KILOGRAMMES PER METRE IN POUNDS PER FOOT.

Kilogrammes per Metre	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	·6720	·7392	·8063	·8735	·9407	1·0079	1·0751	1·1423	1·2095	1·2767
2	1·3439	1·4111	1·4783	1·5455	1·6127	1·6799	1·7471	1·8143	1·8815	1·9487
3	2·0159	2·0831	2·1503	2·2175	2·2847	2·3518	2·4190	2·4862	2·5534	2·6206
4	2·6878	2·7550	2·8222	2·8894	2·9566	3·0238	3·0910	3·1582	3·2254	3·2926
5	3·3598	3·4270	3·4942	3·5614	3·6286	3·6958	3·7630	3·8302	3·8973	3·9645
6	4·0317	4·0989	4·1661	4·2333	4·3005	4·3677	4·4349	4·5021	4·5693	4·6365
7	4·7037	4·7709	4·8381	4·9053	4·9725	5·0397	5·1069	5·1741	5·2413	5·3085
8	5·3757	5·4428	5·5100	5·5772	5·6444	5·7116	5·7788	5·8460	5·9132	5·9804
9	6·0476	6·1148	6·1820	6·2492	6·3164	6·3836	6·4508	6·5180	6·5852	6·6524
10	6·7196	6·7868	6·8540	6·9212	6·9883	7·0555	7·1227	7·1899	7·2571	7·3243

EQUIVALENTS OF POUNDS PER FOOT IN KILOGRAMMES PER METRE.

Pounds per Foot	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9
1	1·4882	1·6370	1·7858	1·9346	2·0835	2·2323	2·3811	2·5299	2·6787	2·8276
2	2·9764	3·1252	3·2740	3·4228	3·5717	3·7205	3·8693	4·0181	4·1669	4·3158
3	4·4646	4·6134	4·7622	4·9110	5·0599	5·2087	5·3575	5·5063	5·6551	5·8039
4	5·9528	6·1016	6·2504	6·3992	6·5480	6·6969	6·8457	6·9945	7·1433	7·2921
5	7·4410	7·5898	7·7386	7·8874	8·0362	8·1851	8·3339	8·4827	8·6315	8·7803
6	8·9292	9·0780	9·2268	9·3756	9·5244	9·6732	9·8221	9·9709	10·1197	10·2685
7	10·4173	10·5662	10·7150	10·8638	11·0126	11·1614	11·3103	11·4591	11·6079	11·7567
8	11·9055	12·0544	12·2032	12·3520	12·5008	12·6496	12·7984	12·9473	13·0961	13·2449
9	13·3937	13·5425	13·6914	13·8402	13·9890	14·1378	14·2866	14·4355	14·5843	14·7331
10	14·8819	15·0307	15·1796	15·3284	15·4772	15·6260	15·7748	15·9237	16·0725	16·2213

EQUIVALENTS OF MOMENTS OF INERTIA AND SECTION MODULI.

Moment of Inertia in centimetre units = Moment of Inertia in inch units × 41·62
Moment of Inertia in inch units = Moment of Inertia in centimetre units × ·024
Section Modulus in centimetre units = Section Modulus in inch units × 16·386
Section Modulus in inch units = Section Modulus in centimetre units × ·061

CONTRACTIONS GENERALLY ADOPTED.

Linear Measure	Square Measure	Cubic Measure	Capacity	Weight
km = kilometre	*km*² = sq. kilometre	*km*³ = cub. kilom'tre	*hl* = hectolitre	*t* = tonne = 1000*kg*
m = metre	*m*² = „ metre	*m*³ = „ metre	*l* = litre	*q* = quintal = 100*kg*
dm = decimetre	*dm*² = „ decimetre	*dm*³ = „ decimetre	*dl* = decilitre	*kg* = kilogramme
cm = centimetre	*cm*² = „ centim'tre	*cm*³ = „ centimetre	*cl* = centilitre	*dkg* = dekagr'me
mm = millimetre	*mm*² = „ millim'tre	*mm*³ = „ millimetre		*g* = gramme
	ha = hectare			*dg* = decigra'me
	a = are			*cg* = centigra'me
				mg = milligra'me

ITALIC letters are used for these contractions, and no stop is used at the right of them.

The contractions succeed the figures to which they refer, on the same line and after the last decimal place, when decimals are used.

COMPARISON OF WEIGHTS OF STEEL PLATES TO 1 INCH THICK.

Divided into 32nds and 40ths of an Inch, and Millimetres.

Millimetres	Weight in lbs. per sq. foot	32nds	16ths
25	40·80	32	16
	39·525	31	
24	38·25	30	15
23	36·975	29	
22	35·70	28	14
	34·425	27	
21	33·15	26	13
20	31·875	25	
19	30·60	24	12
18	29·325	23	
	28·05	22	11
17	26·775	21	
16	25·50	20	10
15	24·225	19	
14	22·95	18	9
	21·675	17	
13	20·40	16	8
12	19·125	15	
11	17·85	14	7
10	16·575	13	
	15·30	12	6
9	14·025	11	
8	12·75	10	5
	11·475	9	
7	10·20	8	4
6	8·925	7	
5	7·65	6	3
4	6·375	5	
3	5·10	4	2
	3·825	3	
2	2·55	2	1
1	1·275	1	

20ths	40ths	Weight in lbs. per sq. foot	Millimetres
20	40	40·80	25
	39	39·78	
19	38	38·76	24
	37	37·74	
18	36	36·72	23
	35	35·70	22
17	34	34·68	
	33	33·66	21
16	32	32·64	20
	31	31·62	
15	30	30·60	19
	29	29·58	
14	28	28·56	18
	27	27·54	17
13	26	26·52	
	25	25·50	16
12	24	24·48	15
	23	23·46	
11	22	22·44	14
	21	21·42	
10	20	20·40	13
	19	19·38	12
9	18	18·36	
	17	17·34	11
8	16	16·32	10
	15	15·30	
7	14	14·28	9
	13	13·26	8
6	12	12·24	
	11	11·22	7
5	10	10·20	
	9	9·18	6
4	8	8·16	5
	7	7·14	
3	6	6·12	4
	5	5·10	3
2	4	4·08	
	3	3·06	2
1	2	2·04	1
	1	1·02	

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